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ABSTRACT

This monograph describes Supplemental Instruction, a student assistance progam designed to improve the academic success of college freshmen based on the idea that if students are not being successful in courses then perhaps colleges should change the way courses are taught. Supplemental Instruction (SI) utilizes regularly scheduled, out-of-class, peer-facilitated sessions that offer students an opportunity to discuss and process course information. SI does not identify high-risk students but rather identifies high-risk classes. The first chapter reviews the SI model, its focus, development, scope, features, placement of administrative responsibility, personnel, funding, and cooperation with advising. Chapter 2 explains in detail how SI works in the freshman year. Chapter 3 offers a review of the research on SI. Chapter 4 looks at why educators and students choose SI. Chapter 5 shows how SI has been adapted to an urban high school, to English composition classes, and to a law school at the University of Missouri-Kansas City. The last chapter reviews the foundation and theoretical framework of SI. An appendix lists institutions currently using SI. (Contains 60 references.) (JB)

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Monograph Series
Number 7

The Freshman Year EXPERIENCE tm

Supplemental Instruction:

Improving First-Year Student Success in High-Risk Courses

Deanna C. Martin
David R. Arendale
and Associates

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National Resource Center for The Freshman Year Experience
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1992

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Improving First-Year Student Success in High-Risk Courses

Deanna C. Martin
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National Resource Center for The Freshman Year Experience
University of South Carolina
1992

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Foreword

John N. Gardner

It is with excitement that I offer my perspectives on this latest monograph in The Freshman Year Experience Resource Center monograph series. Monograph Number Seven explores Supplemental Instruction—a concept on which I am really sold in my capacity as a freshman advocate.

I take as my text for this Foreword an essay entitled, "The Lie and the Hope: Making Higher Education a Reality for At-Risk Students," by Laura Rendon of Arizona State University. Laura presented her essay as a plenary address at one of our Freshman Year Experience Conferences, and my friends at AAHE had the good sense to publish it in their May 1989 Bulletin. Therein Laura spoke and wrote:

> Our educational institutions, particularly higher education, like to perceive themselves as pillars of perfection. When something goes wrong with the system, it is easier to blame the victim for contaminating the system. In so doing, institutions practice scapegoating and focus on the needs or deficiencies of students instead of facing up to the institution's own imperfections.

For the past year or so, we in this country have experienced an enhanced national consciousness that "blaming the victim" is inappropriate. I am suggesting that, in higher education, an analog would be to blame first-year college students for their difficulties or deficiencies in learning, achieving, adjusting, and being successful. The concept of Supplemental Instruction has special appeal to me precisely because it does not blame the victim. Instead, it offers a radical heresy: the idea that if students in great numbers are not being successful—in introductory courses, for example—the problem may well be in the nature of the courses themselves and in the traditional methods of instruction—not primarily within the student. SI is based on the perspective that we need to look, not so much at high-risk students, but at high-risk courses, and then change the way students are taught.

This monograph came about as a result of an invitation I extended to a woman of special vision, talent, and ability who has been laboring in this unique academic vineyard since the middle 1970s and who enabled me to think much more clearly about this notion of high-risk courses and how we can help students succeed in them. I refer to Dr. Deanna Martin, Director of the Center for Academic Development at the University of Missouri-Kansas City. Her concept and vision of what is called "Supplemental Instruction" has influenced hundreds of campuses and many, many thousands of students.

Thus, in many ways, this monograph was intended by me to be a tribute to her and her work. But more importantly, the goal of this monograph is identical to the goal of our overall monograph series, which is to bring creative and effective ideas about enhancing new student learning to the present and future educators of new students. I hasten to qualify that Supplemental Instruction is not exactly a new idea. Rather, it is one that has been refined, extensively studied, replicated, and, by now, extremely well proven.

The more I have learned about SI, the more it has appealed to me, and the more affinity I realize that I have with its basic concepts. The reasons for this affinity include the following:

1. SI involves intensive faculty development. It recognizes that, like our students, we are lifelong learners and we can be even more successful in teaching first-year students.

2. SI provides an opportunity for faculty to encourage and to train undergraduate student leaders to assist in the providing of undergraduate instruction. It is my hope that as in other types of peer teaching/ advising initiatives, that some of these undergraduate student leaders will become future college teachers.

3. SI is not a remedial/developmental approach. It is a support system that is open to all students. It is an approach that is inviting to everyone and says "come and join an SI group, let us move you forward from wherever you are."

4. SI is a unique approach that works with consistent success for first-year students not only at the undergraduate level, but in high school, graduate, medical, and dental schools also.

5. SI uses the power of the small student group for collaborative learning.

6. SI promotes critical thinking because of its emphasis on application, problem-solving, and articulating both questions and responses.

7. SI, like the freshman seminar and the freshman year experience concept, has been nurtured and refined by dedicated educators who have made it their life's work. The results of that effort are now available for you to read herein.

Please read and enjoy. It is my hope that you will consider the prospect and promise of adapting SI to your own campus for the benefit of your very own students in high-risk courses.

Preface

We would like to be able to say that Supplemental Instruction (SI) had its beginnings in the best of what higher education offers—the opportunity to do pure science and research with careful planning, control, and analysis; to be proactive rather than reactive, and systematic rather than serendipitous. If that kind of pure science does exist, it was far removed from our original intentions in 1974. When we started SI with no training and paltry funding, we were simply trying to solve our own institutional and retention problems.

Supplemental Instruction developed from a deep level of dissatisfaction that grew out of our relatively unsuccessful attempts to teach study skills in isolation from course content to minority, first-generation, and other high-risk college students. SI grew out of the conviction that reasoning and study skills must be integrated with course content, not isolated from it. This "single process" approach allows students to construct their own conceptual frameworks for understanding what to learn and how to learn it.

Our growth and recognition for this *simple* idea has come as quite a surprise to us. In the early 1980s, and again in 1992, the SI model was certified as an Exemplary Education Program by the U.S. Department of Education. Our University has received grants through the National Diffusion Network, a division of the U.S. Department of Education, to help other colleges and universities at the national and, most recently, international level design SI programs.

Developing this monograph gave the SI staff here at the University of Missouri-Kansas City an opportunity to examine and clarify our assumptions about SI and to relate its use to the unique needs of first-year students. It is exciting to study the impact that SI has made on hundreds of other campuses in the United States and other countries.

A number of our colleagues in UMKC's Center for Academic Development played an important part in completing this monograph. Former colleagues provided indirect assistance through previous publications and their work in development of the SI model. In particular, we thank May Garland for her many years of work and service. The SI Certified Trainers have been a source of information about improvements in the SI model. Another source of information has been the hundreds of colleges and universities that have implemented the SI model and shared these stories with us and others. To our colleagues at these institutions, we are very grateful.

Thank you for taking time to read and think about SI. We would enjoy hearing your ideas about SI or other models that make a difference.

October, 1992

Deanna C. Martin, Ph.D., Director
David R. Arendale, Ed.S., Associate Director

Chapter One
Understanding the SI Model

Overview

Supplemental Instruction (SI) is a student academic assistance program that increases student academic performance and retention. The SI program targets traditionally difficult academic courses—those that have a 30% or higher rate of D or F final course grades and/or withdrawals—and provides regularly scheduled, out-of-class, peer-facilitated sessions that offer students an opportunity to discuss and process course information. SI does not identify *high-risk students*, but rather identifies *high-risk classes*. SI thus avoids the remedial stigma often attached to traditional academic assistance programs.

SI is open to all students in the targeted course; therefore, pre-screening of students is unnecessary. The program also provides academic assistance during the critical first six-week period of class. SI is often attached to traditionally difficult, high-risk courses that serve first and second-year students. However, each institution may develop its own definition of "high-risk courses."

Assistance begins in the first week of the term. The SI leader introduces the program during the first class session and surveys the students to establish a schedule for the SI sessions. The SI sessions are open to all students in the targeted course, and attendance is on a voluntary basis. Students of varying abilities participate, and no effort is made to segregate students based on academic ability. Since SI is not perceived to be remediation, many underprepared students that might otherwise avoid seeking assistance will participate since there is no stigma attached.

SI focuses on both *process* and *content*. Therefore, learning/study strategies (e.g., note-taking, organization, test preparation) are integrated into the course content during the SI sessions. SI sessions provide immediate practice and reinforcement of these acquired skills. SI collaborative sessions capitalize on the use of the "teachable moment" to apply the learning strategies to the course material. Educational researchers (Dimon, 1988; Keimig, 1983) have concluded that it is difficult to teach transferable study skills in isolation from content material. SI enables students to master course content while they develop and integrate effective learning and study strategies.

SI Addresses Common Factors in Student Attrition

Nationally, high rates of student attrition among first-year college students continue to be a trend (American College Testing Program, 1992). Tinto (1987) predicted in 1986 that, of the nearly 2.8 million students who entered higher education for the first time, over 1.8 million would leave without receiving a degree. Tinto identified four significant factors in student attrition (Spann, 1989; Tinto, 1987):

1. Many students feel socially isolated on campus.
2. Students have difficulty in adjusting to the new environment.
3. Students are not able to link the knowledge received from class lectures to what they already understand.
4. Students experience difficulty in the college environment.

SI addresses these four factors. The SI review sessions provide a safe environment within which students can discuss and process the course material with others. SI students become acquainted with one another as they interact. The SI leader facilitates the discussion so students can make adjustments, discuss what they do not understand, and discover strategies that

unlock the mystery of learning at college. SI participants experience more academic success in target courses than their non-participating peers.

Development and Evolution of the Supplemental Instruction Program

SI was initiated in 1974 by Deanna C. Martin at the University of Missouri-Kansas City (UMKC), an urban public university of nearly 12,000 students at which nearly half the students are enrolled in graduate or professional schools. SI was first piloted in courses in the UMKC Schools of Medicine, Dentistry, and Pharmacy. Pilot programs were funded with local and federal grant monies.

Unlike most student assistance programs that target undergraduate, and particularly first-year students, the SI program was initially developed for professional school students. These students did not show predisposing academic weaknesses when they were admitted to the professional schools. Most had excellent academic records at the high school level and scored well on college entrance examinations. However, many of these students had academic difficulty with certain "high-risk courses" even though they were not "high-risk students." The academic rigor of these courses exceeded the academic preparation by even these well prepared students. After demonstrating that the SI program was successful with professional school students in rigorous courses, the staff was awarded local grants to extend the program to undergraduate courses.

One of the unusual features of the SI program is that it has been successful with both males and females from all ranges of previous academic achievement and ethnicity. Another feature of SI is that its effectiveness is not limited to specific disciplines. It has been effectively used at all levels of the institution (undergraduate, graduate, and professional school) and in a variety of academic disciplines.

Validation of the SI Program by the U.S. Department of Education

In 1981, the SI program became one of the few postsecondary programs to be validated by the U.S. Department of Education as an *Exemplary Educational Program*. The program was then eligible to request national dissemination funds from the National Diffusion Network (NDN) of the U.S. Department of Education. Since 1984, the NDN has awarded UMKC approximately $70,000 each year to assist other institutions in implementing the program. The model was recently revalidated in March 1992 by the Program Effectiveness Panel (PEP) of the NDN. The SI Program is one of only two programs that are officially recognized by the U.S. Department of Education as contributing to increasing student graduation rates.

Current Scope of Supplemental Instruction Programs

SI is currently being used at approximately 200 institutions throughout the United States and has also been adopted by institutions in the Arctic Circle, the United Kingdom, Puerto Rico, Grenada, and South Africa. SI programs range from modest pilot programs of one or two courses to more ambitious programs of 60 (University of Louisville, Kentucky) and 120 courses (Weber State University, Utah). Refer to the appendix for a complete list of institutions that have developed SI programs.

Features of Supplemental Instruction that Contribute to Student Success

The impact of Supplemental Instruction can be quantified by positive differences in student performance and retention rates. A number of features of the SI model operate to influence higher levels of student academic performance. The following factors are most often mentioned by SI staff as well as by participating faculty and students:

The service is proactive rather than reactive. SI schedules are set during the first week of class, allowing students to obtain assistance before they encounter academic difficulty. Most "early alert" retention programs are not triggered until the student has already earned a D or F on a major examination .

The service is attached directly to specific courses. Reading, learning, and study skills instruction is offered in the context of course requirements and as an outgrowth of student questions and concerns. Instruction thus has immediate application. While many students may self-report their need for academic assistance, only a small group will voluntarily attend workshops that feature instruction in isolated study skills.

To facilitate SI, SI leaders attend all class sessions. Such attendance contrasts sharply with the more common tutorial practice of providing instruction based largely upon the student's perceptions of what occurred in class. Student perceptions are often distorted as well as time consuming to report during the academic assistance sessions.

SI is not a remedial program. Although SI is effective with underprepared students, it is not viewed as remedial. In fact, the students who are most likely to volunteer initially are those who tend to be better prepared academically. The willingness of this group to participate encourages the participation of less able students who often find it difficult to admit that they need assistance.

SI sessions are designed to promote a high degree of student interaction and mutual support. Such interaction leads to the formation of peer study groups and facilitates the mainstreaming of culturally diverse as well as disadvantaged students. SI has relied upon the power of group study for the past 20 years, long before the current trend of promoting collaborative learning groups in higher education.

SI provides an opportunity for the course instructor to receive useful feedback from the SI leader concerning the kinds of problems students encounter. Students generally hesitate to be candid about academic concerns to course instructors for fear of demeaning themselves. They will, however, openly acknowledge their problems to the SI leader whose duty it is to assist in such matters and whose responsibility does not include assessment of their course performance. It is difficult to predict which students will drop out and which students will persist. It is much easier to predict those classes which provide a formidable hurdle for students.

Situations in which Supplemental Instruction May Be Less Effective

While success varies among and between SI programs, we are not in possession of data that would suggest that SI has any major limitations. We do know, however, that conducting SI is more challenging in content areas where prerequisite skills are a key variable. For example, if students do not remember any algebra, they will have a particularly difficult time in chemistry. SI can be and is effective in these areas. However, SI leaders must invest more time in planning. SI sessions will often need to last longer than 50 minutes in order to cover additional material and provide additional time for students to practice with and master the course material and study strategies.

It has been our experience that SI is least effective when it is attached to remedial classes. First, students may refuse to attend SI sessions if they do not perceive the course to be demanding. Second, SI has not been effective for students who cannot read, take lecture notes, write, or study at the high school level. Therefore, we stress to adopting institutions that they utilize SI in non-remedial settings with high-risk, demanding courses.

We have also found that the SI model needs to be slightly modified in courses that are problem based and involve practice for mastery. In those circumstances, SI sessions need to be more frequent and sometimes longer in length. For

example, a three credit-hour accounting course might require sufficient SI sessions to allow for the review of various types of problems, or a calculus class might require extended sessions to allow time for modeling and practice so that students become proficient problem solvers.

Placement of Administrative Responsibility for SI

Placement of the administrative responsibility for SI varies from institution to institution. In some smaller institutions the SI program director reports directly to the president or chancellor. Such an arrangement has the clear advantage of immediate contact with the final authority with respect to budgetary support and programmatic decision making.

The most common practice is to place administrative responsibility within either the division of academic affairs or the division of student affairs. Each arrangement has its own advantages and disadvantages. Placement within academic affairs results in greater line authority with respect to faculty involvement and budget. However, faculty are sometimes more hesitant to allow access to their courses if the SI program director reports to the academic dean. Faculty also may be more reluctant to support program funding if such funding competes with their own departmental requests.

Placement of SI within a division of student affairs has several advantages. Faculty may be more willing to invite student affairs personnel than academic affairs administrators into their classrooms to observe class lectures as they assist the SI leader to prepare further sessions. Though student affairs budgets are proportionally smaller, the SI program can earn a higher funding priority within student affairs than may be possible within the priorities of academic affairs. However, there are several potential drawbacks to placement of SI with student affairs. Student affairs budgets are often quite low, and there is rarely enough flexibility within the available resources to accommodate program expenses once faculty requests for the service escalate. Faculty may view the SI program as ancillary or as a "frill" since it is not based within academic affairs or tied directly to their academic department.

Key SI Program Personnel

There are key persons involved with SI on each campus--the SI leaders, the SI supervisor, and the course instructors. Each plays an important role in creating the environment that allows the SI program to flourish.

SI Leader. The SI leader is a student who has successfully completed the targeted class or a comparable course. It is ideal if the student has taken the course from the same instructor for whom he or she is now providing SI assistance. The SI leader is trained in proactive learning and study strategies and operates as a "model student," attending all course lectures, taking notes, and reading all assigned materials. The SI leader conducts three or more out-of-class SI sessions per week during which he/she integrates "how to learn" with "what to learn."

On campuses that implement Supplemental Instruction, SI leaders participate in pre-term training workshops that emphasize the following topics:

- Theoretical bases of learning,
- Teaching methods and forms of learning assistance that are useful in helping students assimilate the course content,
- Study strategies to integrate course material review into the SI sessions,
- Possible problems that might be encountered during SI review session, and
- Actual practice sessions using the SI learning strategies with prerecorded lectures of professors.

SI leaders receive continued training through regular meetings with the SI supervisor. Informal training occurs through the supervisor's observation of the SI leader while she or he conducts SI review sessions. Feedback and specific suggestions for improvement are given by the supervisor at that time.

The SI leader is a *facilitator*, not a *mini-professor*. The role of the leader is to provide structure to the study session, not to re-lecture or introduce new material. The SI leader should be a "model student" who demonstrates how successful students think about and process course content. He or she facilitates a process of collaborative learning, an important strategy since it helps students to empower themselves rather than remain dependent as they might in traditional tutoring. In fact, research suggests that tutoring relationships do not always promote transfer of needed academic skills (Dimon, 1988; Keimig, 1983; Martin, et al., 1990, 1983a, 1983b, 1982, 1981; Maxwell, 1990).

A central responsibility of the SI leader is to integrate study skills with the course content. As someone who has performed well in the course, the SI leader has demonstrated mastery of the course material. However, it is important for the SI leader to share his/her learning strategies with the other students in the SI sessions. If the students only learn content material and not the underlying study strategies, they will have a high probability of experiencing academic difficulty in succeeding courses.

SI Supervisor. The SI supervisor is an on-site professional staff person who implements the SI program and supervises the SI leader. The supervisor is responsible for identifying the targeted courses, gaining faculty support, selecting and training leaders, and monitoring and evaluating the program. Supervisors meet with SI leaders weekly during the term as a group or individually. Supervisors of most programs have formal meetings with all SI leaders together at least three times during the term for follow-up and problem-solving.

The SI supervisor provides the vital organizational link between a number of individuals on campus who administer important program components: the faculty member of the targeted course, department chairperson of the faculty member, college registrar who provides needed data, academic and student affairs administrators, and coordinators of campus facilities used for SI review session meetings.

After initial development and use by several SI programs in the field, the *Student Assistant SI Supervisor* has became an official part of the SI model. Student assistants provide much more flexibility at a lower cost for large programs. Critical qualities needed by such student assistants are a successful record as a Supplemental Instruction leader and the maturity to observe, assist, and supervise other SI leaders effectively.

SI supervisors attend a three and one-half day training workshop covering the areas of implementation and management, training, supervision, evaluation, and study strategies. Continued professional development is available through professional development seminars.

Faculty Members. The third key person in implementing SI is the *faculty member* who teaches the course in which SI is offered. Faculty screen SI leaders for content competency and approve leader selection. Faculty cooperation is an essential ingredient of the SI model. For this reason, SI is *only* used in classes where professors understand and support the concept. A Supplemental Instruction program should be careful not to intrude into classes where the instructor is an unwilling participant. This policy holds true even if department chairs and deans request that SI be attached to certain classes.

If the SI model is presented clearly and in its entirety, professors generally agree that the addition of Supplemental Instruction to their classes can result in the following benefits:

Professors have a mechanism for referring students for additional help. In large classes, professors are

rarely able to give as much individual help to students as they would like. Therefore, faculty members are generally pleased to know that the SI leader is available to assist students who need additional support.

Professors are generally quick to admit that they feel less than competent to help students whose problems are skill-based rather than content-centered.

Professors receive feedback from the SI leaders about questions that students bring to the SI sessions. This feedback can be a useful indicator of the effectiveness of particular teaching methods and can provide professors the opportunity to alter their instructional approach if they are inclined.

Faculty frequently receive higher student ratings on class evaluations when Supplemental Instruction is attached. This phenomenon occurs because students attribute the benefits of the service to the professor. They feel less anxiety and frustration in their efforts to master the material and appreciate the opportunity to receive assistance that is both convenient and effective. Students are grateful to the professor for providing them with an avenue to achieve at a higher level than might otherwise have been possible.

Funding for SI Programs

Most SI programs have been initiated either directly through external support or by reallocating existing resources such as tutorial funds or resource personnel. Grant requests through Title III, Special Services, Health Careers Opportunity Program, Public Health Service, and the Fund for the Improvement of Post Secondary Education have been among the most productive funding sources. Local foundations in some areas have also been willing supporters. Ways in which this program has been supported from internal institutional resources include the following:

Work-Study Support. Student SI leaders can be assigned and salaried for the SI program through the federal work-study program. Generally, SI leaders are required to have a high GPA and, most importantly, a strong academic background in the discipline or course for which they are being considered. Students who view themselves as potential teachers or academicians are particularly good candidates. Institutions with their own self-funded work-study program have more flexibility since they do not have to follow the income restrictions that the federal work-study program imposes.

Joint Appointments for Professional Staff. As professional staff are selected, it may be possible to arrange a joint appointment with one of the academic departments. On the UMKC campus, such arrangements exist on a non-tenure track basis with the stipulation that the professional staff member teach one class a semester for the department. Salary responsibility is shared between the units.

Departmental Support. Departments that desire continued or additional SI services sometimes agree to pay for the service. This is a frequent occurrence once the service has demonstrated cost effectiveness. Sometimes departments assign a teaching assistant position to the SI program. Cooperative financing will develop over time depending upon the way in which academic departments regard the SI program.

Community Projects. At UMKC, the Supplemental Instruction staff participates in varied community projects which generate income. Special teaching projects, faculty development in the public schools, summer programs for young people, and consulting services to businesses and private individuals are some of the most common income-producing activities. Money paid to the Supplemental Instruction staff is deposited into a revolving account that funds special equipment and activities. Some of this money augments the regular University funding for the SI program and allows for the addition of SI sections if the need is present and University funds are unavailable.

Alternative Compensation for SI Leaders. At a few institutions, SI leaders receive academic credit

(e.g., three hours of general education credit) for their work in lieu of receiving a salary. This option gives official recognition to the educational value of the SI experience to the SI leader. In some cases the academic credit comes from the School of Education. This experience can be used as an early teaching experience for education majors. Depending on the institution's tuition and fees, receiving college credit may be more financially attractive to the student than the monetary stipend.

Cooperation With Academic Advising

While Supplemental Instruction is used by a full range of students, it is particularly important for institutions to increase the likelihood that newly admitted, high-risk students will participate. At UMKC, academic advising and the SI program work together to accomplish this objective.

Academic advisors receive a list of high-risk students from the registrar. (At UMKC, students designated as high-risk are those who score below the 33rd percentile on standardized entrance exams and rank in the lower one-third of their high school class.) During the advising period, the advisors urge students who appear on the high-risk list to enroll in one or two courses that have SI sessions attached. If the student agrees, the advisor schedules the class and reserves the hour on the student's schedule for the SI session. Students do not formally enroll in SI, nor are they required to accept the advisor's recommendation. However, most students are eager to enroll in the course and section suggested by the advisor.

At UMKC, peer counselors assist academic advisors with preparing schedules. Since many of these peer counselors have participated in Supplemental Instruction, they are helpful in answering students' questions about SI and can attest to its benefits firsthand.

Other advisors to special groups of students, such as athletes and scholarship students, also recommend that their advisees select classes that are paired with SI. Thus, it is likely that the students appearing in the classes and in the SI sessions will vary widely in their academic preparedness.

Creating Awareness and Generating Support for SI on Campus

Gaining acceptance for any new student support program has historically been a difficult undertaking, especially in times of limited resources. Additionally, since the impetus for new academic support programs often comes from administrators or student affairs staff, there is the risk of a potential opposition among the faculty.

Our experience, as well as reports from other institutions which have adopted SI, leads us to the following three suggestions for generating on-campus program support:

1. *We strongly recommend a pilot program approach.* The best way to generate on-campus support is to have a successful pilot in place. Faculty members who have had positive experiences with SI become the program's strongest advocates.

2. *Begin a pilot program by eliciting the support of one or two faculty members who are well respected among their peers and who teach entry level courses that are traditionally difficult for students.* These faculty should have reputations as excellent instructors who have both rigorous and fair grading standards. They should also be willing to assign a higher than normal distribution of A, B, and C grades if students demonstrate increased levels of performance on examinations.

3. *After conducting the pilot program, it is critical to prepare and disseminate final reports on the outcomes.* Present the findings to other faculty who may be interested in attaching SI to their courses. We suggest that faculty again be approached individually, in small groups, or in departmental meetings. Invite the instructors who were involved in the pilot to be part of these presentations.

When Supplemental Instruction has been implemented on other campuses without a pilot program to generate initial on-campus support, the service has been less than successful. Feedback from these institutions reveals that faculty raise concerns about the following issues:

- Whether the program will be cost-effective,
- Whether it is appropriate for an agency other than an academic department to offer course-specific content assistance,
- Whether the implementation of SI will result in increased faculty workloads,
- Whether and how SI will affect academic freedom,
- What the criteria will be for selecting courses, and
- To what extent such selection will be viewed as a condemnation of teaching performance.

Once such concerns are made public, it is difficult to address them adequately, and attempts to do so are often viewed with skepticism. On the other hand, if SI is willingly piloted within a school or department, the program will generate its own support.

One final note: *While the UMKC SI program has not been able to retain all the students with whom we have worked, we have yet to lose a faculty member!*

Chapter Two
Supplemental Instruction in the First College Year

Introduction

The first year of college can be one of life's most critical transitions, and throughout the history of higher education, this year has always presented challenges both to students and to institutions. The past 30 years have witnessed a profound change in the attitudes of colleges and universities toward first-year students. From a Darwinian (sink or swim) ethic that prevailed well into the 1960s, many institutions have become in recent years far more concerned about the well-being of those in their first college year. Factors that have helped create this concern include the declining numbers of traditional-aged students and the financial ramifications of this change; the increasing diversity (ethnic, gender, cultural) of students; the increasing numbers of older students; and the uneven and often inadequate academic preparation of entering students.

These issues and others have presented a variety of challenges to the academy. Institutions are concerned with how best to meet student needs in times of shrinking resources. Faculty and staff want first-year students to succeed not only for the sake of the students themselves, but also for the sake of the institution's survival and their personal job security.

Not only have the past 30 years witnessed a change in institutional attitudes toward new students, but these years have also seen the growth of substantive research on student development, both cognitive and social. Since 1960, social scientists have provided essential information about why students do or do not succeed in the college environment and what characteristics of students and institutions enhance or detract from that success.

Of particular interest to educators who work with first-year college students is the body of research that investigates the causes and cures of first-year student attrition. Some of the factors that may account for student attrition during the first college year are the many academic and social differences between high school and college. A recent study (Weinstein et al., 1988) identified the following six categories of differences between high school and college that may affect the success of first-year college students: academic environment, grading, knowledge acquisition, support, stress, and responsibility. The study found that college students had less support from family, friends, and teachers; higher stress due to more difficult academic work; increased responsibility for learning; and increased responsibility for making major life decisions. It is no surprise that first-year students are the most prone to withdraw since they have to contend with significant changes in these six categories.

How SI Complements First-Year Experience Programs

In order to assist students in their transition from high school to college and reduce rates of student attrition, many institutions are now offering some version of a "first-year experience" program. Sometimes these programs are conducted during an intense workshop before the beginning of the term or through weekly meetings during the first weeks of the semester. Many institutions, however, conduct "extended orientation" courses over an entire semester (Barefoot, 1992). Supplemental Instruction is an excellent complement to or follow-up activity for first-year experience courses or programs because SI provides a supportive environment for the immediate use of study strategies that may have been discussed or demonstrated in other settings.

A problem common to many "study skills" sessions or classes is that they often rely on *lectures* about study strategies. These instructional sessions are isolated from the

actual content material in specific college courses, causing students to be either frustrated or disinterested. Research has shown that teaching study skills in isolation from content has little if any impact on the students' academic performance (Dimon, 1988; Keimig, 1983). While students can be taught elaborate note-taking and text-reading strategies, these skills may not necessarily be applied in future courses.

Another problem related to isolated study skills instruction is that many students associate skills review as appropriate for "other students," those who need remedial or developmental assistance. Students will have a greater interest in study skills strategies when the skills are directly applied to courses that the students are currently taking (Martin et al., 1983).

Introducing Learning/Study Strategies in SI Sessions

The various activities within SI sessions enhance study skills while being tied closely to course content. Generally, it is not advisable to label these activities as "study skills instruction" but rather to weave particular skills into the context of the course material. By modeling appropriate questioning and reasoning, SI leaders can assist first-year students as they develop the following learning strategies.

Note-taking. Processing lecture notes in the SI session requires first-year students to consider the adequacy of their own note-taking techniques. It quickly becomes evident to many of them that there may be a better method for recording what the professor said than the method they learned in high school. SI leader suggestions might include using summary margin notebook paper (with a wide left margin), recopying notes that are particularly difficult to decipher, writing potential test questions that can be used for reviewing the material in class notes, correlating notes with outside reading assignments, and highlighting notes when appropriate.

For many first-year students, the usual advice to outline and summarize as they listen to a lecture is both unrealistic and counter-productive. If students are unfamiliar with the course content, it is virtually impossible for them to listen to the professor, sort out the important points, and outline or summarize them. This is because students often do not have the necessary background to decide what is important. Further, as students attempt to put the lecture into their own words, they may omit key vocabulary terms or phrases that they need to learn. Instead, first-year students in SI sessions are advised to take down as much information as they can during the lecture, bring their notes to the SI session, and, with the help of the SI leader and other students, reorganize and refine their notes. Students are then encouraged to recopy their notes before the next class period.

Learning to Work with Other Students in Groups. First-year students often find that organizing and processing information together during the SI session is a very beneficial experience. They see that course content is manageable and that with mutual work and support, they can make sense out of even the most difficult material. Because most students tend to study alone, one of the important insights they gain from SI is the extent to which discussing the material with other students increases their own understanding of the content. In future courses when SI sessions are not available, some of these students will form their own study groups.

Test Review. After each exam, the SI leader guides the group in reviewing questions that were particularly troublesome. This process reinforces the correct answers on the exam and gives the students a chance to examine how they interpreted the questions, how they derived the answers, and, if they made an error, why they made it. The SI leader also talks with students about test anxiety and test-taking strategies (e.g., answering the easier questions first and returning to harder questions later, drawing diagrams on the test to see relationships, outlining essay questions, etc.). Reviewing the test will also help students to understand

more thoroughly the kinds of questions the professor asks and to predict future test questions more accurately.

Reading Proficiency Check. During the first part of the semester, the SI leader checks to see how well first-year students are understanding the text materials. The SI leader identifies students who have serious reading skill deficiencies, and a few of them may need to be referred to a reading center or to a tutor who can help them increase their reading proficiency.

Straight text reading efficiency can be enhanced through a procedure called "reciprocal questioning" (Martin & Blanc, 1984). In reciprocal questioning, a small section of the text is selected for silent reading by students. Then both the teacher and the students take turns asking and answering questions. When students become active readers, as this procedure requires, they find that the time they must spend in re-reading material is greatly reduced because they comprehend more information during their initial reading. Examination of text materials will also help students to discover cues that they can use in deciding what reading rate is correct for specific parts of the text. Sometimes, it is acceptable to skim quickly. Other parts of the text will require thorough reading or re-reading.

Referrals to Campus Resources. SI leaders need to be trained to make referrals to other campus resources. This referral role is especially important for first-year students since they may not yet have developed close relationships with an academic advisor or other faculty member/ administrator who also might make referrals. During pre-term SI leader training workshops, time should be allocated to a systematic review of available campus resources and an appropriate way to make referrals.

Learning to Read Charts, Graphs, and Diagrams. If a textbook includes graphs or diagrams, it is important that students are not omitting these aids from their study of the materials. First-year students often think that charts and graphs are extraneous information when they are usually essential to establishing an understanding of the idea. Occasionally, when graphs are used extensively, it is appropriate to review how to read and interpret graphs, as well as to review the material they contain.

Learning about the Syllabus. At times during the semester, it will be helpful to direct first-year students' attention back to the course syllabus. From the syllabus, students can anticipate the dates of future tests and the amount of material to be covered between tests. Some discussion can result that will include tips on time management. Students will often need help in being realistic about how much time is required to prepare for exams and to complete semester-long assignments such as term papers. Global statements like, "You should be working on your term paper all during the semester," are not helpful; rather, SI leaders should help students with such matters as deciding approximately how much time they can expect to spend in the library gathering materials and how much time they should expect to spend in putting the materials together into a paper. This task is much easier when the SI leader has previously taken this course from the same professor.

Teaching/Learning from Experience. The SI leader can become a mentor to the students by introducing strategies that he or she previously found helpful with the course material. It is critical that the SI leader attend class with the students because students will need specific assistance with the each day's reading material and lecture notes in addition to appropriate use of study skills strategies.

Focus on High-Risk First-Year Courses

Retention programs that focus only on first-year students face a unique problem that makes success more difficult: there is often no experience with previous college-level course work that can be evaluated when attempting to determine which students are at high risk.

Analysis of high school grades and standardized college entrance examinations do not identify all students who will drop out of college for academic reasons (Christie & Dinham, 1991; Martin et al., 1983; Tinto, 1987), and attrition cannot be addressed effectively by providing help only to those students who show either symptoms or predisposing weaknesses. The treatment must be more generalized, and the problem must be addressed at or near its source: the mismatch between the level of instruction and the level of student preparation.

First-year courses which are difficult for students include those that have the following characteristics: large amounts of weekly readings from both difficult textbooks and secondary library reference works, infrequent examinations that focus on higher cognitive levels of Bloom's taxonomy, voluntary and unrecorded class attendance, and large classes in which each student has little opportunity for interaction with the professor or the other students.

While it may be difficult to guess correctly which students may withdraw from college, it is relatively easy to learn, by using standard institutional data, which courses have large numbers of student withdrawals or Ds and Fs as final course grades. At UMKC, Supplemental Instruction is offered with those first-year courses in which over 30% of the students either withdraw after the drop/add period or earn Ds and Fs. Other institutions may establish different criteria for designating a course as "high risk." For example, some colleges and universities implement SI in classes where the overall rate of student success is reasonably high, but low for some student subpopulations that the institution has targeted for special retention activities.

SI is Helpful for a Variety of Student Subpopulations

Based on data collected by UMKC concerning our own SI program and SI programs from adopting institutions from across the U.S. and several foreign countries, SI appears to be effective with all subpopulations of students. Prior levels of academic preparation, motivation level, gender, ethnicity, age, academic discipline, and whether or not the student works have not been found to change the effectiveness of SI significantly.

Among these student subpopulations, three groups are of special interest to first-year student educators: academically talented students, remedial/developmental students, and students from both groups who can be characterized as field-dependent learners. SI can be helpful for these and other student populations with different needs.

Academically Talented Students

When many educators think of a dropout "profile," most would not assume that the academically talented student would be a candidate for concern. However, sizeable portions of these students drop out and should not be overlooked as they are among the easiest to retain. In fact, SI was initially designed to help talented medical, pharmacy, and dentistry students at the University of Missouri-Kansas City. Unacceptably high numbers of these students were dropping out or being academically dismissed from these professional school programs. Research suggests that all students, including the talented upper quartile students, earn higher grades if they are SI participants.

Recent research has focused on the academic needs of talented students attending selective institutions. Wratcher (1991) focused on first-year students attending Carnegie Mellon University who had not experienced difficulty in high school but who, in the collegiate environment, experienced academic failure. The study found that this subset of students from the entire group of academically talented students would often go into periods of denial when faced with academic difficulty. These periods might last throughout the first year. According to Wratcher's research, these students compounded their problems by failing to seek

academic assistance even though they were encountering academic difficulty and earning poor grades. The students reported that they feared the stigma of identifying their own academic failure. But because of failure in one or more classes, these students had a high probability of being placed on academic probation following their first or second semester at college. Other behavior themes associated with this student subpopulation included perfectionist tendencies and stress resulting from parental and personal expectations. These behaviors compounded the difficulty that these academically able students were already experiencing.

Supplemental Instruction is used at several selective institutions since it meets the needs of academically talented first-year students. Academic assistance begins the first week of class, and all students are encouraged to attend the sessions at least once each week, irrespective of their current or predicted academic performance. Since SI is open to all students, it avoids the stigma of being remedial or developmental. In fact, SI has been offered within honors programs for students who wished to maximize their content mastery.

Remedial/Developmental Level Students

Another student population that needs academic assistance is at the opposite end of the continuum of academic ability. These are "dependent" learners who are in need of remedial or developmental education and who require extensive assistance during the first year of college (Levitz & Noel, 1989). "The underprepared student is often one who may have the basic intellectual capacity but who has reached a point of impasse temporarily created by a mismatch between his or her knowledge base and the new information that he or she is expected to absorb on an independent basis" (Tomlinson, 1989, p. 20).

One of the characteristics of first-year college students is a common difficulty in making the transition from high school to college. Both the speed and scale of transition is a problem for many students (Tinto, 1982). If this transition is difficult for the general student body, it seems that it would be particularly difficult for developmental students/dependent learners. The nature of the high school environment often helps these students meet the minimum academic requirements at this level: daily homework; weekly examinations; daily class attendance; and social support from their family, friends, or other social groups. Most of these characteristics are missing at the college level.

First-year developmental students are particularly in need of academic assistance that helps them develop independent learning skills. In SI, students have the opportunity to learn and master the strategies of independent learning. SI sessions provide them the opportunity to practice and therefore internalize these skills, making them far less likely to drop out in succeeding semesters.

Field-Dependent Learners

Learning styles of students have been the subject of considerable research. One model for understanding differences in learning styles is to place students on a continuum between "field-dependent/relational/affective" and "field-independent/analytic/nonaffective" (Anderson, 1988). The field-dependent learner prefers to learn material that can be placed in a larger context. On the other hand, the field-independent learner appears to have a higher tolerance for material that is inanimate and impersonal. These learners are able to see and understand information that does not have a clear context.

Research findings indicate that these are not polar positions, but rather opposite ends of a continuum of preferred learning styles. Most students are located somewhere along the continuum, and such positions are subject to change throughout life. Research data suggest that field-independent learners are more typically Caucasian males. Field-dependent learners are often female, African-American, Native-American, or Hispanic students who need to connect their new learning with previous

experience or other familiar information (Anderson, 1988).

Supplemental Instruction provides an environment that can be helpful for both field-dependent and field-independent learners. Field-dependent learners have an opportunity to see many connections between old and new academic material through discussion and review of previous lecture material. Outside reading materials and class lecture notes can be synthesized together. Additionally, through skillful facilitation by the SI Leader, familiar contemporary events can be connected to the course material. Students can become more engaged since each SI participant has the opportunity to be involved actively in the class discussions.

SI sessions are helpful for field-independent learners as well since they have another opportunity to gather missed information from class lectures or outside readings. These students also benefit from study strategies that provide more effective ways to organize and understand the course material.

SI Links Theory and Practice

Recent social science research and scholarship on college students have provided a comprehensive theoretical framework for first-year student programming. In retention and student development research, three interrelated factors have emerged repeatedly as predictors of student success and improved retention. These factors, which have become central objectives of many first year student programs, are (a) a felt sense of community, (b) involvement of students in the life of the institution, and (c) academic/social integration. Supplemental Instruction provides a framework within which to accomplish each of these objectives.

SI Develops a Sense of Community

Many higher educators are concerned about the lack of a felt sense of community among students who attend a particular college or university. Many factors within the collegiate environment, such as the increasing diversity of students and the decreasing numbers of them who live on campus, work against the building and maintaining of campus community. Colleges and universities, therefore, must develop creative approaches in order to provide an environment in which a sense of campus community can flourish.

Tobias (1992) suggests that, through a focus on active learning in small classes that include more interactions between the teacher and students and among students, a sense of community can be developed within the classroom. SI brings students together in small groups for class study sessions, and, for some of these students, this is their only time to interact with other classmates. An indirect result is that students may sense that the institution is a caring community that supports their academic success.

In a small but important way, SI meets one of the most pressing challenges to the development of a sense of campus community—the ethnic diversity of entering college students. Among the several strategies colleges and universities may employ to enhance the multicultural awareness of their students, one successful strategy is to design structures which bring different students together to work on a common task. In these settings, students feel more comfortable to express themselves and to share more naturally their perspectives on issues as interpreted from their own unique cultural traditions (Dash, p. 19). SI sessions provide such an environment. The SI session may be, for some students, the first time they have worked with others outside of their cultural groups. The SI experience can help break down some stereotypes and can provide an opportunity for discussion and sharing of culturally diverse points of view.

SI Facilitates Student Involvement

Astin (1985) and his colleagues argue that increased levels of involvement with a college or

university leads to higher student talent development. Astin offers the following simple definition for involvement:

> Quite simply, student involvement refers to the amount of physical and psychological energy that the student devotes to the academic experience. Thus, a highly involved student is one who, for example, devotes considerable energy to studying, spends a lot of time of campus, participates actively in student organizations, and interacts frequently with faculty members and other students (p. 36).

An essential component of increased student involvement is a focus on academic work. Light (1992) reports that ". . . [S]tudents who get the most out of college, who grow the most academically, and who are happiest, organize their time to include interpersonal activities with faculty members, or with fellow students, built around substantive, academic work" (p. 6).

SI provides a natural setting for involvement of first-year students with their peers and with an upperclass student who serves as the SI leader, and this increased involvement is focused primarily on academic work. SI participating students spend more time on campus reviewing class content in a structured, effective session that involves others.

SI Facilitates Academic and Social Integration

In his research on student retention, Tinto (1987) found that four clusters of events tend to be experienced by college students before they make the decision to drop out: poor adjustment to the college environment, an experience of either academic or social difficulty, incongruence between the student's expectations and the demands of the institution, and a feeling of social isolation. These clusters of events tend to be felt most acutely during the first year. Institutions that want to improve rates of first-year student retention need to develop structures that help students adjust to both the academic and social life of the campus, that assure the delivery of pre-matriculation promises to students, and that decrease the likelihood that students will feel isolated from the life of the campus.

There is research evidence to suggest that Tinto's model applies to all students, despite ethnicity, and "major constructs of Tinto's model have largely withstood the test of time" (Cibik & Chambers, 1991, p. 130). Within this theoretical framework, however, minority students are at especially high risk of "malintegration" to academic and social systems. For students in general, separation from past communities and memberships and a bewildering transition to college life can set the stage for departure during the first year. For many minority students at predominantly white institutions, the necessary social, cultural, and mental adjustments are simply insurmountable (Cibik & Chambers, 1991).

SI provides all students, but especially minority students, an opportunity to practice and master essential academic skills in a supportive small group setting without the stigma of remediation. SI also gives students the opportunity to feel part of a group that is bonded by a common purpose and concern. The critical element of SI in this integration process is the SI leader. The SI sessions are structured and paced through the facilitation of the SI leader.

SI Enhances Affective and Cognitive Development

Collaborative learning activities do more than just raise final course grades for students. Considerable research has been conducted on cognitive and affective changes within students who participate in such activities.

Critical Thinking Skills. Research suggests that students who work in collaborative learning groups develop their critical thinking skills since they have an opportunity to be engaged actively through peer-group discussions and development of responsibility for their own learning (Johnson & Johnson, 1986; Smith, 1989).

Thinking and language abilities are closely linked. Collaborative group work is cited as a strategy for the development of thinking since it encourages students to construct their own understanding (Chaffee, 1992). Too often college students sit silently in class without the opportunity to vocalize and interact with others.

Some researchers suggest that critical thinking is content specific (Brookfield, 1989; Kender & Kender, 1991; McPeck, 1981; Meyers, 1986). This finding has particular importance for SI since SI is attached to specific courses. SI's course specificity may explain why some students who demonstrate course competency and receive high grades have academic problems in courses from other disciplines that have no SI component.

Social Skill Development. Most college students spend much of their academic lives studying and working by themselves. However, once they enter the work force after college graduation, they will probably spend the next 40 years working within teams. While colleges and universities may be quite efficient at imparting content material, they are often woefully inadequate in producing effective employees who can successfully interact and work with new colleagues at a job site. Collaborative learning encourages students to ". . . view each classmate as a potential helper rather than as a competitor" (Astin, 1987, p. 17).

Light (1990) reports that even new students at highly selective institutions lack essential social skills needed for success both during college and after they enter the work place. He states, "[Students] point out that the process of working in a group, in a supervised setting, teaches them crucial skills. The skills. . . include how to move a group forward, how to disagree without being destructive or stifling new ideas, and how to include all members in a discussion. Few students, if any, have these skills when they arrive at college" (pp. 70-71).

SI sessions can assist students in developing their social skills. Through small group problem-solving activities, group lecture-note construction, and other activities, SI participants see other students in class as valuable sources of information. They no longer feel limited to the professor and the textbook as resources. Additionally, discussions with students from diverse backgrounds expose students to a variety of points of view. Knowledge of these broader viewpoints and more effective social skills will be important when the students join an ethnically diverse work force.

Affective Growth. Collaborative learning groups provide a different environment from the traditional classroom because of their social context, the group goal, and the semi-independence of each group. Rather than being a silent classroom, the collaborative learning groups are active and participatory (Sandberg, 1990). These characteristics help to explain why affective growth of participants is more likely to occur in collaborative learning groups.

SI is particularly effective in helping students develop self-confidence and self-esteem as they experiment with new learning strategies without the risk of a poor grade which may put financial aid and academic eligibility in jeopardy. As students gain supportive feedback from the SI leader and other SI students and receive higher grades, their self-esteem spirals upward.

Conclusion

In collaboration with a variety of other first-year experience programs, SI can be an important asset for increasing student effectiveness, retention, and satisfaction. SI provides an environment to review, practice, and apply study strategies presented during orientation programs, and SI leaders can make referrals to other campus resources when needed. Finally, SI sessions can contribute to development of the student in terms of interpersonal skills, multicultural education, and self-esteem. SI provides an excellent way to "front-load" institutional resources on behalf of first-year students.

Chapter Three
Review of Research on Supplemental Instruction

Introduction

Supplemental Instruction (SI) targets *high-risk courses* rather than high-risk students. At many campuses high-risk courses are typically defined as difficult, entry-level courses in which the unsuccessful enrollment rate (the percent of final grades of D, F, and withdrawals) is more than 30%. Examples of such courses at the University of Missouri-Kansas City include General Chemistry I, Western Civilization I, and Foundations of Philosophy. As new SI programs are developed, they often place an emphasis on entry-level courses. Therefore SI has served primarily first-year and sophomore students. However, the program has also been effectively implemented in courses where students are likely to fail at the graduate and professional school level (e.g., medicine, dentistry, pharmacy, business, and law) both at UMKC and other post-secondary institutions.

The primary purpose of SI is to assure that a course is no longer "high-risk" for students. However, even when the D, F, and withdrawal rates have been reduced, SI should not be discontinued. Data show that if SI is discontinued, the rates of Ds, Fs, and withdrawals return to the original baseline. The only condition under which SI should be discontinued is when a change in the course itself results in uniformly higher grades and, subsequently, lower levels of student participation in SI. Institutions that implement SI measure its impact through analysis of comparative data for students who participate in SI and those who do not.

The definition of a "high-risk" course relates to a single factor: the percent of students who complete the course successfully. For our own purposes, we consider it irrelevant whether the high rate of poor grades and/or withdrawals is a function of the course content, the instructional method, the hour the course is offered, or the population to whom it is offered. What we consider important is that students have academic difficulty.

We make no claim that SI addresses every need. Our goal is not to evaluate the curriculum or the instructional delivery of the professor, but rather to help the enrolled students perform satisfactorily in traditionally difficult courses. Other institutions, however, sometimes have other concerns (e.g., curriculum reform, improved instruction). Some institutions have addressed these issues with the introduction of SI.

There is substantial evidence that attrition follows poor grades. Students tend not to withdraw from courses or drop out of college when grades are acceptably high. Recent research (Schreiner, 1990) has suggested a strong correlation between grade point averages and persistence in college (Table 1).

Table 1
Dropouts and Persisters by College Grade Point Average (N = 3,874)

Grade Point Average Range	Dropouts (n = 1,060)	Persisters (n = 2,814)
GPA Below 2.00	42.1% (n = 336)	15.8% (n = 445)
GPA 2.00 to 2.49	18.9% (n = 200)	24.9% (n = 701)
GPA 2.50 to 2.99	19.6% (n = 208)	26.2% (n = 737)
GPA 3.00 to 4.00	19.1% (n = 206)	33.1% (n = 931)

Schreiner, L. A. (1990). The College Student Inventory: Accurately identifying students at risk. Iowa City: Noel/Levitz National Center for Student Retention.

SI is designed to increase student academic performance and has an indirect positive effect on student retention and ultimate graduation.

The effectiveness of Supplemental Instruction in producing positive changes in participants' academic performance has been documented by ongoing research conducted since 1981 by the University of Missouri-Kansas City as well as research from other institutions participating in SI. This chapter reviews the methodology and results of these various research efforts.

Research Methodology

Research Design

The basic design of the various quasi-experimental research studies conducted since 1981 compared performance of the treatment groups (voluntary SI participants) with the control groups (non-SI participants). Additional analyses compared participants and non-participants in terms of their motivation to participate, their prior academic achievement, and their ethnicity. Dependent variables included final course grades, re-enrollment, and graduation rates. The research does not meet the standards for a true experimental design, but results have been replicated across many institutions.

Population

The population studied includes all students enrolled in courses in which SI was offered, whether or not the students participated in SI. For some analyses, the population represents only students from UMKC; other analyses include students from all institutions in the United States where SI has been adopted and effective data collection efforts have been made.

Instruments and Procedures

Course rosters and background data (e.g., ethnicity, standardized entrance test scores, high school rank) for students enrolled in SI targeted courses were obtained. A student survey was administered the first day of the course to determine the motivation level of the students with respect to SI. A second survey was administered the last day of the course to gain information from SI participants (e.g., evaluation of the SI program) and non-SI participants (e.g., reason for not attending SI). Faculty members in the targeted courses provided a list of students and their grades on the first major examination in the course. Final course grades, re-enrollment and graduation data for students were also obtained after the semester for students enrolled in the targeted classes.

The procedures initially followed at UMKC were recommended to other participating institutions. Due to differing administrative structures of the many schools participating in the study, not all were able to gather data in precisely the recommended fashion. However, all reported their data gathering procedures, and evaluators determined that data gathering procedures of institutions included in the larger studies were precise enough to meet reasonable standards.

Data Collection and Analysis

The UMKC National SI Director was in charge of all data collection and analysis. The Director was also responsible for the collection, analysis, writing, and distribution of periodic reports on the SI program's effectiveness.

Standard statistical methods were used in analysis of data. The level of significance was set at $p < .01$ when independent *t*-tests were employed to compare final course grades. A significance level of $p < .05$ was set when using chi-square tests for comparing the following three sets of data: the percentage of A and B final course grades, the percentage of D and F final course grades and withdrawals; and the rates of re-enrollment. The chi-square level of significance was set at $p < .01$ for the study of graduation rates.

Chi-square at .05 level of significance was used with nominal data to heighten the sensitivity of

measures. On the other hand, a .01 level of significance was used with interval data in order to enhance its specificity.

Results

Academic Achievement for UMKC Students

Since 1980, UMKC has offered SI in 190 courses at the undergraduate, graduate, and professional school level. An analysis of data on grades and withdrawal rates (Table 2) found that the SI participants at UMKC

-earned a significantly higher percentage of A & B final course grades,
-earned a significantly lower percentage of D & F final course grades and withdrawals,
-earned significantly higher mean final course grades than the non-SI participants.

Table 2
SI UMKC Data: 1980 to 1991 (N = 190 SI Courses; N = 7,845 SI Participants)

Year	SI Participation Status	SI Participation Percent/ Number	Number of SI Courses	Percent A & B*	Percent D, F & Withdrawal*	Final Course Grade**
1990-91	SI	34.1% (774)	18	53.4%	16.0%	2.61
	Non-SI			38.7%	31.2%	2.23
1989-90	SI	30.3% (753)	19	58.3%	16.7%	2.70
	Non-SI			41.9%	34.8%	2.29
1988-89	SI	29.9% (614)	17	63.2%	15.6%	2.81
	Non-SI			45.7%	28.9%	2.39
1987-88	SI	34.1% (775)	24	60.4%	13.7%	2.80
	Non-SI			43.8%	28.9%	2.39
1986-87	SI	44.3% (778)	19	56.3%	18.3%	2.65
	Non-SI			40.9%	34.1%	2.41
1985-86	SI	39.1% (584)	16	51.5%	18.7%	2.55
	Non-SI			41.2%	28.7%	2.34
1984-85	SI	42.6% (788)	17	59.7%	16.8%	2.83
	Non-SI			42.9%	25.4%	2.27
1983-84	SI	34.1% (765)	19	54.5%	17.3%	2.76
	Non-SI			39.5%	29.5%	2.24
1982-83	SI	43.1% (1,119)	19	52.2%	17.9%	2.51
	Non-SI			36.8%	28.2%	2.07
1981-82	SI	40.9% (329)	5	58.2%	20.9%	2.61
	Non-SI			38.5%	26.7%	2.09
1980-81	SI	32.2% (556)	17	50.1%	14.2%	2.56
	Non-SI			32.5%	33.1%	2.16

*Level of significance for differences: .05 using chi-square test. **Level of significance for differences: .01 using independent *t*-test.

Controlling for Motivation. To control for motivation level, all students were surveyed in the spring of 1991 on the first day of class concerning interest in SI. Students were asked to rate their motivation to attend SI on a five-point Likert scale (5=high; 1=low). Since the scheduled times for the SI sessions were not announced until the second class sessions of the semester, students were not aware of any time conflicts. Students who selected "4" or "5" were designated as "highly motivated." During the last class period of the semester another survey was given to all students in the class. Students who did not attend any SI sessions during the semester were asked to select one of the designated choices for not attending SI. If a student selected either time conflict with work or with another college class and had also indicated high motivation to attend SI on the first day SI survey, the student was assigned to the non-SI motivational control group.

Creation of the non-SI motivational control group permitted comparison across the three groups: SI participants, non-SI participants (motivational control), and non-SI participants (all others). The following differences were seen in the academic performance data in Table 3. Students using SI services

- *had entry data (high school class rank percentile, and college entrance test scores) comparable to data of the other groups;
- *had significantly higher average course grades compared to both non-SI groups ($p < .01$); and
- *had considerably fewer D and F grades and withdrawals than either of the non-SI groups ($p < .05$).

Table 3
Comparison of SI Students, Non-SI (Motivational Control) Students, and Non-SI (All Other) Students (N = 644)

Group	Percent A & B Final Course Grade *	Percent D, F & W Final Course Grade *	Final Course Grade **
SI Students ($n = 209$)	44.5%	16.7%	2.45
Non-SI Students (Motivational control) ($n = 194$)	34.5%	34.5%	2.13
Non-SI Students (All Other) ($n = 241$)	26.3%	51.1%	1.90

*Level of significance of difference: .05 using chi-square test. **Level of significance of difference: .01 using independent *t*-test.

While it is clear that the more highly motivated perform at higher levels than the less motivated, motivation alone does not account for the majority of the differences between the SI and non-SI students with respect to the measures investigated. There are significant and substantial differences between the SI group and the motivational control group in both course grade and percent of unsuccessful enrollments.

Academic Achievement for Students from All Institutions Participating in SI

Nearly 100 colleges and universities submit data reports annually on their SI programs. The following table was compiled from data submitted by 49 institutions. These institutions were selected for analysis because they represent a cross-section of different institutional types, have rigorous data collection procedures, and transmit their data in a timely fashion. Table 4 provides findings from these 49 institutions. These findings are similar to those drawn from the UMKC campus alone.

Table 4
National Field Data (1982 - 1991) for SI Courses (N = 1,477)

Group	All Institutions (n = 1,477)		Two Year Public (n = 126)		Four Year Public (n = 1,071)		Four Year Private (n = 267)	
	Percent D,F, or W	Course Grade	Percent D,F, or W	Course Grade	Percent D, F, or W	Course Grade	Percent D,F, or W	Course Grade
SI	23%*	2.46**	24%*	2.64**	23%*	2.37**	19%*	2.54**
Non-SI	38%*	2.12**	41%*	2.31**	35%*	2.07**	32%*	2.27**

*Level of significance of difference: .05 using chi-square test. **Level of significance of difference: .01 using independent t-test.

Increased Rates of Persistence and Graduation

Ongoing research at UMKC indicates that students who participate in SI persist at the institution and graduate at higher rates than students who do not participate. Tables 5 and 6 provide information from UMKC comparing re-enrollment and graduation rates of SI participants and non-participants.

Table 5
Re-enrollment Rates of UMKC Students Enrolled in SI Courses, Fall 1989 (N = 1,689)

Group	Re-enrollment, Spring 1990
SI Students (n = 479)	90.0%*
Non-SI Students (n = 1,210)	81.5%*

*Level of significance of difference: .05 using chi-square test.

Table 6
Cumulative Graduation Rates of Fall 1983 UMKC First-Time, First-Year Students (N = 349)

	By Summer 1987	By Summer 1988	By Summer 1989	By Fall 1989
SI Students (n = 124)	19.4%**	25.8%**	28.2%**	30.6%**
Non-SI Students (n = 225)	9.3%**	15.1%**	17.8%**	18.2%**

**Level of significance of difference: .01 using chi-square test. Includes all students who were not enrolled in professional degree programs.

Effectiveness with Students of Differing Academic Preparation

Despite prior academic achievement, students participating in SI within targeted high-risk courses succeed at a higher rate than those who do not participate in SI. Data were analyzed to determine the utilization and effectiveness of SI services for students at UMKC with differing previous academic achievement (Table 7). Previous academic achievement was defined by high school (percentile) rank and mean composite score on the ACT entrance examination. Students were

Table 7
Comparison of SI Participants and Non-Participants at UMKC with Differing Levels of Previous Academic Achievement: 1989 - 1990 Academic Year (N = 1,628)

Group Composition	Percentage of Students in Targeted Classes	High School Percentile Rank	Mean Composite ACT Score	Percent Re-enrolled Following Semester	Final Course Grade
Top Quartile SI (n = 112)	32.9%	87.5	26.8	92.9%	3.29**
Top Quartile, Non-SI (n = 288)	67.1%	82.1	27.0	93.1%	2.83**
Middle Two Quartiles SI (n = 262)	27.6%	68.7	21.3	90.5%*	2.67**
Middle Two Quartiles Non-SI (n = 687)	72.4%	67.7	21.4	77.9%*	2.28**
Bottom Quartile SI (n = 104)	30.7%	64.9	15.1	85.6%*	2.10**
Bottom Quartile Non-SI (n = 235)	69.3%	63.5	15.7	77.9%*	1.77**

*Level of significance of difference: .05 using chi-square test. **Level of significance of difference: .01 using independent t-test.

divided into quartiles on the basis of their mean composite ACT score as compared with other UMKC students.

The data in Table 7 warrant the following observations. Students in the bottom quartile used SI services at nearly the same rate as did students in the top quartile. Despite quartile ranking, SI-participating students earned significantly higher grades than their non-participating counterparts. SI participating students in the bottom quartile and the middle two quartiles re-enrolled at the institution at significantly higher rates than their non-participating counterparts. While the SI and non-SI groups in the top quartile re-enrolled at 93%, the top quartile SI participants received a significantly higher mean final course grade.

SI services appear to meet the needs of students with a wide range of previous levels of academic achievement within the same group setting, thus reducing the necessity for the institution to provide additional and separate tutorial programs.

Effectiveness with Minority Students

Irrespective of ethnicity, students participating in SI within targeted high-risk courses succeed at a higher rate (withdraw at lower rates, receive a lower percentage of D or F final grades, and earn higher average final grades) than those who do not participate in SI. In a recent study of 2,410 students at 13 colleges and universities, minority students who participated in SI earned higher final course grades than their non-participating peers. These institutions were selected because they had numerous SI sections in place, had sufficiently rigorous data collection procedures, and had transmitted their data in a timely fashion. The 13 institutions represent a cross-section of institutional types (3 two-year public colleges; 4 four-year private colleges and universities, and 6 four-year public colleges and universities). The following data were provided for each student in the study: race, standardized entry test scores, number of times attending SI, and final course grade. As the data in Table 8 indicate, whether the minority students were from the top or bottom quartile of their ACT test score group, the SI participants received a lower percentage of D and F final course grades and withdrawals than their non-participating counterparts.

Table 8
Effectiveness of SI for Minority Students with Differing Levels of Previous Academic Achievement (N = 299)

Group Composition	Percent D, F, & W		Mean Final Course Grade	
	SI	Non-SI	SI	Non-SI
All Students	36%*	43%*	2.02**	1.55**
Lowest Quartile	Not Collected	Not Collected	1.87**	1.35**
Highest Quartile	Not Collected	Not Collected	2.64**	1.97**

*Level of significance of difference: .05 using chi-square test. **Level of significance of difference: .01 using independent *t*-test.

The data in Table 9 reveal that minority students used SI services at equal or higher rates than Caucasian students.

Table 9
1987 SI Participation of Students from Different Ethnic Groups (N = 2,410)

Caucasian (n = 2,111)	African-American (n = 174)	Hispanic (n = 55)	Asian/Pacific (n = 42)	Native American (n = 28)
33.8%	42.0%	50.9%	33.3%	42.9%

An additional study was undertaken at UMKC to determine the effectiveness of SI participation on the academic performance of 100 African-American students who were enrolled in 12 courses in the College of Arts and Science, School of Pharmacy, and School of Basic Life Science in Fall 1987. Data in Table 10 suggest that the 39 African-American students participating in SI earned a statistically significant higher mean final course grade and a lower percentage of Ds and Fs than the 71 students who did not participate.

Table 10
Effectiveness of SI with UMKC African-American Students (N = 110)

Group	Number/Percentage Students	Percent D, F, or W	Mean Final Course Grade
SI-Students	39 (35.5%)	31%*	2.20**
Non-SI Students	71 (64.5%)	46%*	1.80**

*Level of significance of difference: .05 using chi square test. **Level of significance of difference: .01 using independent *t*-test.

Validation of Supplemental Instruction by the U.S. Department of Education

In 1981, after a rigorous review process, the SI program became one of the few postsecondary programs to be designated by the U.S. Department of Education as an Exemplary Educational Program. The SI program was recertified in 1985 and 1992. The U.S. Department of Education has validated the following three claims of effectiveness of the SI Program:

1. Students participating in SI within the targeted high-risk courses *earn higher mean final course grades* than students who do not participate in SI. This is still true when analysis controls for ethnicity and prior academic achievement.

2. Despite ethnicity and prior academic achievement, students participating in SI within targeted high-risk courses *succeed at a higher rate* (withdraw at a lower rate and receive a lower percentage of D or F final course grades) than those who do not participate in SI.

3. Students participating in SI *persist at the institution* (re-enroll and graduate) at higher rates than students who do not participate in SI.

Chapter Four

Reasons Educators and Students Choose SI

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SI Helps Maintain High Academic Standards

The challenge for educators in colleges and universities is to make quality learning experiences accessible to as many students as possible. In courses that are traditionally difficult and where growing numbers of students are academically underprepared, SI assists the institution in maintaining high academic standards for course work by offering a learning support system that enables students to meet high academic standards. Students who participate in SI earn higher grades than those who do not participate. The grade differential is about one-half to one full letter grade, regardless of the student's level of academic preparedness.

Faculty concern about content competency, regardless of test grade distributions, is not unreasonable. Lowering standards will not accomplish learning for weaker students anymore than raising standards will automatically result in increased learning performance. The solution is for schools to support faculty efforts to maintain high standards of academic excellence while providing students with the means to achieve all that is being asked. The challenge is to provide these services in a manner that is cost-effective for the institution as well as acceptable for the student.

SI Is Cost-Effective

Consider the comparison between SI and the traditional tutorial system. The tutor often sees only one student at a time and is thereby limited in the number of students served. The SI leader can provide quality learning experiences for up to ten or twelve students per session. The tutor often spends valuable time establishing the specific issues related to the actual content of the course while the SI leader has already attended the class sessions and is positioned for immediate discussion and review. When the tutor's scheduled appointments are canceled or result in a "no-show," the tutor's time (and institution's money) are wasted. Most SI sessions will vary in numbers of attendees, but a normal predictable attendance curve can be established allowing for maximum efficiency and productivity.

Also, while SI leaders provide, by comparison, a much higher level of student utilization hours, it costs no more to train or retrain SI leaders than tutors. In fact, many institutions have simply converted their traditional tutorial or graduate teaching assistantship programs to the SI model while incurring little or no additional expense. In fact, some report considerable savings, especially when one considers differences in retention and graduation rates.

Cost-effectiveness can be examined in terms of two separate issues: *cost* of program and *effectiveness* of program. While these are interrelated issues, they can be evaluated independently. Costs may be assessed as high, moderate, or low. Similarly, program effectiveness may be assessed as high, moderate, or low. When cost and effectiveness are combined, the outcome may vary greatly. For example, low program cost may correspond to high program effectiveness or inversely, high program cost may correspond to moderate or low program effectiveness.

From the data we have generated, as well as that collected in the field, SI offers a highly effective program at a moderate to low cost. The primary cost is in salaries to SI leaders. At UMKC, the unit cost of SI, (i.e., hourly wage of the SI leader), is figured in the following way. For example, if the SI leader receives $750 per course

per semester and if he/she serves 30% (a conservative figure) of a class of 100 students, the unit cost, based on five contact hours per student, is $5.00 per hour. This unit cost diminishes as the number of students served increases.

When considering the unit cost, SI compares favorably with the cost of using individual tutors who are paid a minimum wage or higher. Also, tutors must be paid for scheduled hours when students do not keep appointments. In SI, it is rare when no one attends. To further reduce the cost of SI, UMKC actively recruits work-study students who are content-competent and can be used as SI leaders at no cost to the University. Also, in some cases, scholarship students are used and the cost included in their scholarship funds.

Another way to evaluate cost-effectiveness is to compute the money generated by re-enrolling students who might otherwise have left the university. Such amounts vary from campus to campus, but it is clear that retention and stable enrollment are financially beneficial to the college or university. Cost-effectiveness is a matter of dollars and credits. At UMKC, the economics of the SI model work in favor of the institution. Analysis of differences of re-enrollment rates of SI participants compared to non-participants in 1991 reveal that SI appears to return $1.50 to the campus for every dollar invested. Other institutions report similar findings. Moreover, the "affective effectiveness" of SI--enhancing or salvaging college careers--exceeds dollars and credits.

High-Risk Courses Are Easy to Identify

One of the difficulties in establishing and maintaining an academic support system is identifying with precision the population that is at risk academically. College entrance exams and high school ranking are often poor predictors of student success in specific content areas. SI avoids this problem because it intervenes at the systemic rather than individual level by providing support for those courses in which it can be predicted with a great deal of certainty that students will encounter difficulty. Rates at which students receive Fs, Ds, or Ws (withdrawals) from "high-risk" courses are often very consistent from semester to semester; thus, such courses are easy to identify.

With respect to the identification of at-risk students, the point is not that *we* know who they are, but rather that *they* know who they are. With SI, it is not as important that educators know *who* is at risk, it is important that they know *where* students are at risk. In reality, the at-risk population usually self-identifies; most persons are capable judges of their own weaknesses in specific content areas. If not, low test scores from course examinations provide students with adequate feedback for reappraising their proficiency in a particular discipline or course. Likewise, low test scores also provide motivation for student participation in SI.

SI Meets Pragmatic Needs of Students

Most students view course work pragmatically. Their goal, with some exceptions, is to achieve the highest possible grade and move toward the completion of their degree program. Many view difficult courses as a hurdle to get over. To the extent they are able to achieve a desired grade without assistance, they are unlikely to commit themselves to the time requirements of additional study sessions. In other words, student motivation for participation in SI is linked to actual or perceived course performance.

Field research provides support for this observation. For instance, one campus had identified a traditionally difficult course (high rate of Ds, Fs, and withdrawals) and had successfully instituted SI in the class. The SI sessions were well attended, and the results were consistent with national data, (i.e., a 50% reduction in D and F final course grades and in withdrawals). The following semester the same course was taught by a different instructor. On the first exam of the semester under the new instructor, every

student in the course received an A. The result was to no one's surprise: SI attendance fell off completely. In this case, SI no longer met a felt need of the students. The end result, of course, was that the SI supervisor wisely withdrew SI from the course the following semester. This particular course no longer met the criteria of being traditionally difficult, at least from the perspective of the students. SI is traditionally well attended on a voluntary basis precisely because students perceive its usefulness.

SI Evaluation Is Based on Actual Student Performance

Most student academic support services are evaluated by feedback gathered from the perceptions of students who use the particular service. While this type of evaluation is important in giving direction to the overall quality of the program or in identifying specific areas that need improvement, it does not provide hard data for determining overall program effectiveness. SI's effectiveness is measured not only by perception of services rendered but also by the actual performance of students in the classroom, i.e., the final grade assigned to each student. This "bottom line" approach not only helps program administrators to know where real rather than perceived improvements are being made but also becomes a powerful tool for making informed budgetary decisions concerning program implementation and/or continuation.

It is also important for individual students who take part in SI to know exactly what difference SI participation will make for them in their future academic career. Most students are, by necessity, protective of their time, and unless the benefits of involvement in another activity can be clearly demonstrated, they will be slow to participate. Also, with a fact-based evaluation of SI, students can be helped to see the overall time savings of attending SI. It is easier, it might be argued, to make the additional time commitment of attending SI sessions than to risk having to repeat an entire course.

SI Avoids a Remedial Image

Many students are resistant to identify themselves with remedial programs for some obvious and not-so-obvious reasons. They sometimes want to avoid the stigma that they believe is associated with being perceived as a "slow learner." SI avoids this remedial image because it offers the same assistance to all class participants who want to maximize their opportunity to earn a good grade. Trained SI leaders reinforce this idea when they introduce SI at the beginning of each semester. They often begin by informing students about the grade differential between last year's SI participants and nonparticipants. Then they ask to see a show of hands of those students who think they would be interested in participating in the service. The better students usually are the first to raise their hands, and the weaker students typically follow their lead.

It should also be stressed that SI attendance is not only voluntary, but it is anonymous as well. That is, SI attendance is not reported to the instructors. This eliminates concerns the individual student may have about being labeled as either a weak student or a teacher's pet. Neither is the instructor tempted to inflate grades because the student made an extra effort by attending SI.

SI is Non-threatening

Because SI is peer-facilitated, it provides a nonthreatening atmosphere within which the student can voice concerns or ask questions about the overall nature of the course as well as about specific issues related to its content. This is especially true when SI is attached to large lecture courses. SI allows students to support students. Often--perhaps ideally--SI leaders have already taken the particular course from the same instructor and are therefore able to act as guides with first-hand experience. They are able to provide structured study sessions related to course content as well as reassurance or advice about the course in general.

Many students are hesitant to request general course information from the instructor. They often want to know such things as the relationship between the assigned text and the course lectures, how testing is handled, the exact nature of what is required on certain assignments, and so on; but they are sometimes afraid of appearing overly uninformed or of offending the instructors. Usually, instructors are not reluctant to address these concerns, and most would prefer to make clear any indistinct issues related to the course. If, however, students are reluctant to ask the instructor, they can address such questions to the SI leader.

SI Creates a Sense of Community

SI sessions provide students with the opportunity to make personal connections in a college or university system that can be fairly impersonal. It has been shown that this personal sense of belonging and connectedness is an important factor in retention. National data reveal that most students who involve themselves in SI sessions re-enroll in greater numbers and graduate at higher rates than those who do not attend SI sessions. Certainly one reason for SI's positive correlation with retention and graduation is that SI is in place on the first day of class, thereby providing students available help and support before they encounter serious difficulty and become frustrated. This is especially true in entry level courses where large numbers of first-semester freshmen struggle against their initial feelings of isolation and alienation.

SI Offers Students Transferable Study Strategies and Proactive Participation

Institutions that feature SI report that SI participants sometimes initiate their own impromptu study groups in courses where SI is not offered. SI, in this instance, provides a good model for efficient study. Many students are reluctant to involve themselves in group study, preferring instead to study alone because they have had a bad experience of disorganized and unstructured groups. SI provides organized cooperative learning experiences for students which stress good group study habits like systematic note review, predicting test questions, developing vocabulary, and so on.

Studies also show that when learning is proactive and participatory rather than reactive and passive, students gather and retain knowledge at higher levels. Students often lack a platform to articulate what is or is not being learned. But when students are allowed to present information in their own words, they are also able to make connections with information presented and to solidify certain concepts.

Conclusion

SI was created in response to an immediate need of students who were earning poor grades and withdrawing from UMKC. With scarce institutional resources and intense time pressures on students, SI continues as a voluntary academic support service only because it meets the perceived and real needs of both the institution and the participating students.

Like UMKC, other institutions are interested in maintaining both high academic standards in high-risk courses and providing academic success for a diverse student body. SI provides a cost-effective and tightly evaluated program that does not project a remedial image.

Students attend SI sessions because they experience higher academic success and an academic community of supportive peers. The study strategies that they practice in the SI sessions are often transferable to other classes.

While SI is a simple concept, it is not simple to implement correctly. If done well, it takes considerable effort: appropriate identification of classes, proper selection and training of SI leaders, vigilant supervision, close attention to the data, and development of relationships with administrators and faculty that are ongoing and supportive. It is a team effort. When the resources are provided to implement SI properly, the outcomes are remarkably predictable.

Chapter Five

Additional Applications of Supplemental Instruction

Use of Supplemental Instruction at an Urban High School

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While various strategies for learning support have been employed and found useful at the college and university level (Noel, Levitz, & Saluri, 1985), it has been difficult to transport these strategies to the public secondary schools. Particularly troublesome has been the effective development of programs addressing the needs of inner city, ethnically diverse secondary schools (Blanc, 1981; Presseisen, 1985). Through collaboration between educators at the University of Missouri-Kansas City and the local public schools, Supplemental Instruction (SI) was selected as the major academic support component for the students at Westport High School, an inner city school in Kansas City.

The Westport High School SI Project

The student population of Westport High School is approximately 60% African-American, 20% Latino, 14% Anglo, and 6% Asian-American. In 1988, when the SI program was introduced to Westport, the total dropout rate at Westport was 30%. Additionally, on any given day, 30% of the students were absent from one or more classes. Nearly 50% of Westport students were two years behind in reading and math, and 25% were one year behind grade level. Nearly 60% of the students were economically disadvantaged as evidenced by their qualification for the federally funded free lunch program.

The opportunity to work with high school students at Westport occurred as a part of the Schools, Colleges, Universities Project (SCUP), a grant from the U.S. Department of Education. The purpose of SCUP was to encourage students to complete high school and continue with post-secondary education or pursue a vocational career. UMKC provided training and supervision for the SI component of the program. The SCUP grant was supplemented with funds from a private initiative, Project Choice, an educational support program provided by the Ewing Marion Kauffman Foundation.

Common Student Learning Problems

While students may be underprepared for many reasons, one common educational concern about underprepared students is that they typically lack the ability to reason effectively. Research suggests that half of entering college freshmen have not yet attained reasoning skills at the formal (abstract) operational level (Arons & Karplus, 1976) described by Piaget and Inhelder (1958). Students who appear to operate at the concrete (nonabstract) level consistently have difficulty processing unfamiliar information when it is presented through the abstract media of lecture and text.

Student questions about material are often detail-oriented and superficial. Rarely do students ask or answer questions which require inference, synthesis, or application. Students can operate at more advanced levels once they have mastered a concept, but to do so they require regular instruction that either anchors the concept directly in their previous experience or provides a concrete experience with data from which the concept may be inferred. (Atkins & Karplus, 1962; Fuller, 1980; Karplus et al., 1976; Renner et al., 1976). Deficiencies in these fundamental skills underlie most problems with basic academic skills such as reading, language, and mathematics.

Research studies with a wide variety of high school populations indicate that substantial gains in the level of reasoning and questioning skills can be achieved expeditiously through appropriate learning strategies and techniques (Blanc, 1981; Jones, 1985; Presseisen, 1985; Schneider & Renner, 1980). Similar findings have been reported in the college or university setting (Keimig, 1983).

Program Objectives at Westport High School

While the overall desired outcome was to increase appropriate academic behavior and skills among the targeted student population at Westport, the following measurable objectives were established for the targeted ninth and tenth grade populations:

1. To increase the retention rate,
2. To increase the attendance rate,
3. To increase class grades in history and English,
4. To increase scores on standardized tests, and
5. To improve affective domain scores on selected instruments.

History and English classes at Westport were selected for implementation of SI because many students routinely experience academic difficulty in reading and notetaking in the history class and writing in the English class.

Westport Program Design

Individuals selected to lead the SI sessions at Westport were college students who were approved by the high school course instructor and certified as content-competent. Most of these college students were education majors, but some were majors in other disciplines. These SI leaders were recruited from Kansas City area colleges, paid through funds provided by the SCUP grant, and were trained in learning strategies most appropriate to their content discipline. SI leaders underwent intensive training before they began working with Westport students, and additional training was provided on an ongoing basis through daily staff meetings. The training workshop was similar to training provided for SI leaders who worked at UMKC, but one unique training component dealt with student discipline procedures.

SI leaders attended the targeted history or English class, listened, and took notes. By attending class sessions, SI leaders were better prepared to help students understand the language of the course as they integrated the lectures and readings. Since these SI leaders had direct knowledge of the class material, they were better able to model good student behavior during the SI sessions. High school students also were more responsive to the SI leaders since the leaders attended class along with them. The SI leader and Westport teacher in either the target English or history class met briefly each week to discuss upcoming lesson plans. The teachers often shared handouts, curriculum guides, and other helpful materials that the SI leaders then used to develop SI session plans.

Typically, SI leaders conducted two to three 50-minute SI sessions each week during regular school hours. SI program staff felt that it was critical that the academic intervention be offered during the school day to avoid the familiar problems of transportation, family responsibilities, extracurricular activities, and part-time work hours.

Westport SI leaders were supervised by staff from UMKC. The SI supervisors accompanied SI leaders to class lectures, assisted with planning strategies for SI sessions, and accompanied leaders to their SI sessions. After the SI session, the SI supervisor debriefed the leader and made suggestions for improvement. The time commitment of the SI supervisors varied over the course of the semester. During the first month of the academic term, the SI supervisor accom-

panied the SI leader to all class lectures and SI sessions. After this first intensive period, the supervisor's time commitment diminished.

By targeting high-risk courses rather than high-risk students, the SI program avoided the remedial stigma associated with most academic support programs. Therefore, students at various levels of ability felt comfortable participating freely in the risk-free environment of the SI sessions. From the beginning, the program was proactive, not reactive, in that SI was offered at the start of the semester, allowing students to obtain assistance before they encountered academic difficulty.

Westport SI Evaluation Results

During the same time that the SI program was implemented at Westport, a number of other services were introduced through the SCUP grant and the Kauffman Foundation. Some of these included counseling and career guidance for students. Workshops for parents and closer ties between the family and school were developed. As the high school changed from a neighborhood school to a school designed to be part of a magnet choice program, the student population changed. However, the only new academic enhancement program that worked with all the ninth and tenth grade students was SI. Interpretation of data collected during the three-year pilot program indicated that SI contributed to increased student performance in several areas.

Progress was made in improving the students' final course grades in English and history. The control measures were mean final course grades of ninth and tenth grade Westport students before the SI program was introduced. When comparing SI attendance and improvement in grades from quarter to quarter, there was a significant change in grades when examining the students at the lower end of the grading scale. Within that group, there was significance as great as one-half letter grade improvement in history and three-fourths letter grade improvement in English. SI participating students were also asked to rate the SI program's impact in helping them perform better academically, and the majority of the students reported that the SI program was effective.

Westport teachers generally found the SI sessions to be helpful and cited incidents which convinced them that SI was making a difference. Teachers felt that students participated more in class, and they also believed that better scores on standardized tests were attributable to SI reinforcement.

Summary

In summation, the SI program provided the central academic support focus for ninth and tenth grade students at Westport High School. While not the only relevant factor, the SI program contributed to increased student performance.

After completing a three-year pilot test, the initial program results appear favorable. While there has been some difficulty in implementing this comprehensive learning assistance program during the regular school day, the results in improved academic performance and improved student discipline warrant further program use.

Supplemental Instruction can be implemented in a variety of other ways in other high schools. Upperclass students, adult volunteers, parent volunteers, or other persons could serve as SI leaders and supervisors. With the support and creativity of high school administrators and faculty, many opportunities exist for the effective adoption of Supplemental Instruction at the high school level.

Adapting SI To English Composition Classes

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Former Director, Writing Center
Point Loma College

With funds from a Title III grant, the Learning Center at Point Loma College was established to serve the student body of 1,800. Point Loma College in San Diego, California, is a private liberal arts college with a reputation for academic rigor. Historically, these high standards have resulted in the loss of about 33% of our students before graduation. From the outset, Supplemental Instruction (SI) was considered a key component of the Learning Skills Center's program, and SI was implemented in order to improve the retention rate of both high-achieving and underprepared students.

In addition to providing support in such traditionally high-risk courses as chemistry, physics, statistics, history, and music theory, Learning Center staff thought that Supplemental Instruction would also help first-year English composition students significantly through an emphasis on the following elements of the SI philosophy:

1. The discovery of learning in a non-threatening environment,
2. A focus on developing a "co-worker" relationship between the SI leader and students,
3. An awareness of process as well as content in teaching and learning,
4. The importance of reasoning skills in developing writing competency, and
5. The role of the student as a responsible agent in his/her own educational process.

In-Class Activities of the SI Leader

Because of the unique nature of English composition, academic support activities in English take on their own personality and guidelines. As in the more typical SI sessions, the English composition SI leader attends class daily, listens to lectures, takes notes, and completes assignments just like other students. Since many of our composition classes include in-class writing, the SI leader is often asked to help the students with editing during the class period. (A special editing process is discussed later in this section.)

SI leaders understand that they will not assign grades to papers or essays. They may suggest corrections or additions to papers, but only in the presence of the student. They may also, if the professor wishes, introduce concepts or answer student questions to clarify points made by the professor. Primarily, SI leaders are responsive to the professor's wishes within whatever boundaries he/she establishes.

Professors request different kinds of assistance from SI leaders. For instance, in one class with a large number of ESL (English as a Second Language) students, the professor concentrates on meeting the special needs of the ESL students and assigns the SI leader to assist other students in the class. This division of responsibility permits a higher degree of individualized instruction. Another professor, who considers the Learning Center's editing process to be particularly valuable, asked students to work with the SI leader before they submitted their papers. Since this professor taught three sections of English composition, he scheduled papers so that no more than one class had a paper due during any given week. The Learning Center Director, aware that the SI leader could not be expected to see each student personally, assigned tutors to assist with the workload during weeks that papers were in process. These additional tutors were trained in the editing process and were briefed by the SI leader as to the nature of the assignment and the

**Jan McMillin is now deceased. This article was originally published in 1983.*

professor's expectations. Students were scheduled for 20 minutes of individual assistance.

These adaptations of the SI model were the result of cooperative planning among professors and the Learning Center staff: professors identified their own needs for assistance, and the Learning Center staff generated the action plans, tailoring them to the individual requests of professors.

Out-of-Class Activities of the SI Leader

In addition to in-class activities, SI leaders schedule a minimum of two hours a week in the Center's Writing Lab and inform students of times they are available in the Lab. Through the Lab's tutoring coordinator, all tutors and SI leaders keep up-to-date on teaching methods employed by individual professors. Students are thus assured of informed assistance anytime the Lab is open.

During an SI leader's Writing Lab hours, he/she may hold a typical SI review session. For example, if students are completing grammar exercises, a group of them will gather with the SI leader in a corner of the Lab to work together on mastering the concepts in the daily assignment. Often, however, the students come in to edit their own writing with the assistance of the SI leader or a tutor. In an effort to incorporate the SI philosophy into a one-on-one editing session, we have structured a tutor-student dialogue. All Writing Lab personnel receive training in the use of the dialogue and adhere closely to its structure. A typical dialogue and the corresponding rationale follow.

Editing Dialogue and Its Rationale

The SI leader begins the editing session by asking a series of questions:

SI Leader: What would you like to work on today? *(The idea of "helping" is avoided in favor of the "co-worker" model - two people pooling their efforts to improve a product.)*

Student: I have a paper for Dr. Seamans, and I need someone to look it over.

SI Leader: O.K. Is there anything in particular you'd like me to look for? *(Whenever possible we choose questions that put students in charge of their own learning to reinforce the idea that students are capable of identifying the categories in which their errors are most likely to occur. If students cannot answer the above question, restating the question as "What problems have you encountered in other papers?" will most probably elicit a response.)*

Student: Well, in my last paper, I had difficulty knowing when to start new paragraphs, so I think I would like to work on that.

SI Leader: O.K. If I find anything else that needs work, do you want me to point it out? *(The SI leader respects the student's right not to want to see all of his/her mistakes. Nearly all students, of course, opt to have additional errors identified. It is the act of allowing the student to give the SI leader permission to point out more problems that is critical to establishing the co-worker relationship.)*

Student: Yes. I want to find all the errors I can.

SI Leader: O.K. Now we've learned that most students speak more correctly than they write. Often you will catch mistakes when you hear yourself read aloud that you would not catch reading silently. So I want you to read your paper aloud. If you come to something you feel uncomfortable with, something you don't like, stop and comment. If I hear something that seems awkward to me, I'll comment. *(Note: The student reads the paper, not the SI leader. The student, not the SI leader, holds the pencil. The student has the first option to point out his/her own mistakes as well as the assurance that the SI leader will comment on additional errors.)*

Student: I don't like this part right here.

SI Leader: What don't you like about it?

Student: It just doesn't sound good.

SI Leader: Where do you feel the trouble is?

Student: It sounds funny right here. *(Student points out awkward phrase.)*

SI Leader: I agree. What's wrong with it?

Student: I don't know.

SI Leader: Would you like me to tell you?

Student: Yes.

SI Leader: *SI leader points out the rule that makes the phrase in error.)* Do you want to know how to fix it?

Student: Yes.

SI Leader: O.K. Take out a piece of paper. Write this down. *(SI leader restates the rule and gives various options for fixing the problem as the student writes them down. The SI leader is very directive about pointing out ways the student may correct the error in an effort to make sure the information will be useful to the student on his/her next paper.)*

In the above dialogue the two most important phrases the SI leader uses are: "I agree" and "Would you like me to tell you?" Whenever possible the leader tries to stay away from "That's right" or "That's wrong." Again, the instructor attempts to emphasize the co-worker relationship and minimize the role of critic. Likewise, the instructor asks the student's permission to instruct him/her. Once this permission is given, the instruction is direct and avoids complicated digressions.

When the student has finished writing, the SI leader turns his/her attention back to the phrase in error and asks:

SI Leader: Why is this sentence incorrect? *(Student restates the rule.)* How would you like to fix it? *(Together they discuss the possible merits of available options and the student selects what he/she thinks is the best one.)* O.K. Let's continue. *(Student continues reading. Within the next few lines the SI leader stops the reading after a particularly good sentence and asks another question.)* What did you think of the last sentence? *(The student usually hesitates, thinking that something must be wrong, or the SI leader would not have asked the question. Typically, the student is unable to find any error, and usually responds in the following manner.)*

Student: It sounds O.K. to me.

SI Leader: I agree. I think that you have expressed that point quite well. Please continue. *(It is as important for students to recognize their well-stated thoughts as it is their errors, perhaps more so.)*

The student continues through the paper, circling misspellings and underlining inappropriate words. The student and SI leader will come back to them later. It has been our experience that too much immediate attention to editing breaks the student's train of thought and ruins the flow of the paper. When the editing is complete, the SI leader draws the student's attention to the running list of corrections and says:

SI Leader: Do you feel your paper is better now than it was?

Student: Yes! A lot better.

SI Leader: I think so too. How many corrections did we make?

Student: Oh, maybe 30 or 40.

SI Leader: *(He/she points to the list of errors.)* How many types of errors are you making? *(The SI leader helps the student categorize the errors.)*

Student: Only three! I made all those mistakes, but it looks like it was because I kept making the same kinds of errors over and over.

SI Leader: Right! On your next essay I suggest that you read your paper aloud, look only for the types of errors we identified today, and correct them. Then bring the paper in, and we'll see how close we can get to making it perfect.

Each session ends with words of caution and encouragement by the SI leader that go something like this . . .

SI Leader: You and I found a lot of errors today. When you correct these and make a clean copy, other errors will become evident which your professor will undoubtedly spot. No matter how many times we worked on your essay, some errors would probably slip by. Don't be discouraged if this happens. Remember what your paper was like before you edited it, and be encouraged by the fact that it is much better now than it was.

Often, of course, the editing process doesn't go as smoothly as the previous example implies. Sometimes students' papers are so poorly organized that there is no way to make sense out of what may be perfectly constructed sentences. Often problems of run-ons, sentence fragments, and subject/verb agreement are so monumental that to point out mistakes in spelling or punctuation seems insignificant.

Since writing is a developmental process requiring the mastery of many individual skills, we have divided the editing process into three sequential areas of instruction:

1. Organization (relationship of the thesis to the main categories of the paper);
2. Sentence "sense" (run-ons, fragments, agreement, and word choice);
3. Mechanics (spelling and punctuation).

We deal with each area of instruction individually and sequentially. The SI leader will not go on to Number 2 until Number 1 is in good shape. The SI leader will not point out spelling and punctuation errors until fragments and run-ons are eliminated.

Conclusion

Supplemental Instruction in English composition at Point Loma College is still in its fledgling stages. We continue to develop teaching strategies and materials that give students more hands-on experience, making explicit the process of *how* to do the assignment. Whenever possible, we design teaching methods that promote the discovery of sound writing principles. This, above all, allows students to develop their own understanding of good writing and helps them to become independent of tutorial assistance.

At the end of two full years of operation, we have reached some preliminary conclusions. On the positive side, we know that the average student who participates regularly in SI does better by one half a letter grade than the student who does not participate. We also know that students who use the service regularly continue to do equally well in subsequent English courses, even though they attend the Lab less and less frequently. Also, faculty feel greatly served by the program, and SI leaders and tutors say that their own writing improves as a result of the opportunities they have to teach and learn.

On the negative side, we know that a few students use the Lab as a crutch, as an emotional support, and refuse to be weaned. We know that some students are offended by our policy of facilitating their learning rather than handing them the answers. Finally, we know that the middle range of students seeks us out most often and that the students who need help most are still reluctant to use our services.

In the final analysis, we know that the whole process needs more time and study. Meanwhile, real excitement comes from seeing students emerge from this instructional process more in control of their writing and better able to complete their educational program successfully.

Use of SI at the University of Missouri- Kansas City School of Law

Peggy Tyler Hall, M. A.

SI as an Integrated Means of Academic Support for Law Students

Over two decades ago, O'Neil (1970) cited the critical shortage of minority individuals in law schools and in the legal profession and discussed the issues related to establishing special standards for this population. Faced with a shrinking pool of applicants, law schools have attempted to concentrate on special academic support programs designed for students who are members of disadvantaged groups and who are not admissible to law school by traditional criteria (Leonard, 1987).

Beginning in 1967, UMKC instituted a number of piecemeal academic support efforts to assist students wishing to enroll in law school who were academically deficient in one or more areas. But in the fall of 1990, following a year in which very few first-year special admission law students were retained, the Law School requested that the University's Center for Academic Development design a more integrated model of academic support for first-year law students using Supplemental Instruction (SI). The decision to use SI was based on the evidence that successful academic support programs for law students need to promote independent learning skills and multiple learning systems in order to achieve long term grade improvement (Wangerin, 1987).

Description of the SI Law School Program at UMKC

The goals of SI were to raise academic performance and improve student retention rates, especially with the first-year "special-admit" law students. The pilot program was announced to all first-year law students during Fall 1990 orientation, and these students were given the opportunity to select their preference of three scheduled SI sessions for each of four courses: Introduction to Law, Contracts I, Property I, and Criminal Law.

These courses were chosen because they are traditionally difficult and because instructors in them were supportive of the SI pilot. Students were informed that SI was a voluntary program but that available space was limited. Although students registered for SI on a first-come, first-serve basis, special-admit students were guaranteed places in one of the three SI sections for each course.

SI leaders were second- or third-year law students who had taken the targeted course from the same instructor. In addition to formal training prior to the beginning of the term, SI leaders received ongoing training and supervision throughout the term by a Center for Academic Development staff supervisor. The program design received strong administrative support from the UMKC Law School and from a law professor who volunteered to assist with weekly meetings and to monitor the program throughout the semester.

SI leaders attended all class lectures, took notes, completed assigned readings, and conducted three review sessions each week. By modeling effective student behavior and thinking strategies, SI leaders assisted students with the language unique to law, the integration of lecture and readings, and the development of appropriate questioning and reasoning techniques. Students also received experience in essay writing that specifically addressed the particular expectations of each instructor.

The only changes in the second year of the program were to limit the target courses to Contracts I and Constitutional Law for more consistency and to add an experienced SI leader to assist with ongoing training and supervision.

Program Results

After the completion of the program's second year, final grades in both Contracts I and Constitutional Law were compared for SI participants and non-participants. For purposes of this analysis, participants were counted only if they attended the regularly-scheduled SI sessions at least four times over the course of the semester. Using this criterion, 101 out of 157 students participated.

All students except one in the "special admissions" category participated in a Supplementary Instruction group at least once during the semester. Because of the high participation rate of special admissions students, control groups of non-attending special admissions students were not available for meaningful comparison in two of the three SI sections. However, mean grades for first-year SI participants in all sections of Contracts I and Constitutional Law were from one half to one full grade better than non-participants. Only one special admissions student who participated in SI was dismissed for academic reasons

Conclusion

There is a significant possibility that as the pool of law school applicants shrinks, the academic credentials of those in the pool will decline. For many schools, this may mean either admitting a substantially smaller class or reducing admissions standards. For schools dependent upon tuition, formal tutorial programs are ideal. But the cost-effectiveness of these programs may still remain an issue. Using SI in this instance proved very cost-effective, serving 101 students at a per-student cost of approximately $64. The Law School at the University of Missouri-Kansas City is pleased with the results and plans to continue the program.

Chapter Six

Foundation and Theoretical Framework for Supplemental Instruction

Traditional individual tutorial practices may be described as following a medical model: an individual is identified as needing professional assistance on the basis of a) prior history and diagnostic testing, b) self-referral in response to perceived symptoms, or c) referral by another professional in response to observed symptoms. In some institutions, identification of high-risk students is based primarily on prior history of test scores (see "a" above). These tertiary institutions are likely to be somewhat selective, requiring students to submit to extensive prematriculation testing and interviews. Professional schools and private, selective colleges are among those fitting this category. Students entering such institutions typically commit for the long term and, at a minimum, can be expected to persist for at least a year. Under these circumstances, academic therapy with students at risk can begin immediately upon matriculation and can continue until students give evidence of being able to function independently in the academic environment.

As noted in "b" above, some students self-refer. Their symptoms in these instances may range from free-floating anxiety in the academic setting to unsatisfactory performance in one or more highly specific settings. The tutor or resource specialist must function first as diagnostician, identifying the basis for the student's self-referral and differentiating among anxiety and a variety of other reasons for unsatisfactory performance. Having established at least a tentative diagnosis, the tutor then becomes the therapist, helping the student to negotiate the academic demands of the institution.

Implementation of "c" above requires another professional, usually a professor or graduate teaching assistant, to become aware that a student is in academic difficulty. This awareness may come in a variety of ways, most likely in the wake of unsuccessful performance on an academic task. For example, the faculty member may refer the student for tutorial assistance to correct an academic problem that has become apparent because of a low test score. In this instance, the tutor functions, as described in the previous paragraph, first as a diagnostician and then as a therapist.

Rationale for a Non-Traditional Approach

It was in a milieu dominated by tutorial services in the medical model that Supplemental Instruction (SI) developed. The developers at UMKC found that several of the assumptions of the medical model either did not apply or were not practiced in their institution. Subsequent adoption of SI on other campuses may indicate that the same assumptions were found wanting on these other campuses as well.

As noted, the traditional model relies on identification of the "high-risk" student, the student who is deemed to be deficient or "at-risk" in some way. In institutions other than those described, (i.e., selective tertiary and professional schools), several factors preclude such pre-matriculation identification.

First, entering students must be known to the faculty and staff in time for key personnel to establish contact with at-risk students. Second, it must be noted in this context that neither prior performance nor standardized testing is sufficiently reliable as a prediction criterion of who is and is not at risk. As many as 50% of those whose prior scores indicate they are at risk prove to be successful without intervention, and a significant proportion of those who are not identified in this manner prove to be unsuccessful.

Timely identification of students who are at risk is difficult in the traditional model. Faculty who can refer students for corrective instruction are rarely able to make a referral prior to the scoring

of the first course examination. Students who are referred after that time are at a considerable disadvantage, trying to catch up with the class after a very poor start. And, in fact, the rate of student attrition across courses is greatest in the first six weeks or after the first exam when students may find their grades disappointing (Martin et al., 1983a; Noel et al., 1985).

Students who are at risk are among those least compliant with faculty recommendations for special help, whether for personal counseling or for academic assistance. Such students often perceive that tutorial help, far from relieving them of their academic burden, actually increases the burden as they must now answer to a tutor in addition to the course professor.

Finally, students who are at risk are notorious for their reluctance to refer themselves for assistance until much too late. Whether through denial, pride, or ignorance, students who need help the most are least likely to request it. So goes the axiom of the learning assistance trade.

SI first developed in an institution which did not fit into the medical model described at the beginning of this chapter. At UMKC, students were able to register as late as the first day of class, with their prior transcripts and test score data to be submitted sometime prior to the beginning of the following semester. This large, inner-city, commuter institution, typically turned over 40% of its students each semester, most of them due to transfer but some due to the phenomenon now known as "stopping out" as distinguished from "dropping out." "Stopping out" referred to the widespread practice of taking no classes during a semester which would be devoted to other priorities such as working to re-establish a bankroll sufficient to permit subsequent re-entry.

SI developers at UMKC cite the following unique approach to this program

1. Identify the "high-risk" course rather than the "high-risk" student,
2. Deliver services to students from the first class meeting rather than wait for students to be referred or to self-refer,
3. Integrate study skills instruction with the content of academic disciplines,
4. Deliver support services in the geographic area assigned to the academic departments rather than in a separate assistance center,
5. Encourage peer collaborative learning and instructing students in the techniques which make that study mode effective, and
6. Assure that participation is voluntary at every level of SI program support.

Delivery of services from the first day of class changes the support program from a reactive to a proactive mode. One of the non-cognitive variables which differentiates between more capable and less capable students is this: those who are less capable are inclined to do without support services until they need them; those who are more capable will avail themselves of services at the beginning and then discontinue services if they find the services to be neither productive nor essential. The presence of these more capable students in support sessions affirms that the sessions are not remedial. That fact enables less capable students to participate without the fear of stigma.

The integration of skills and content allows the SI leader to meet the perceived content needs of students while delivering essential skills instruction at the same time. If, as McLuhan argued, "the medium is the message," then the message of SI is skill instruction, delivered through the medium of content.

Delivering services on an outreach basis, (i.e., in the geographic area assigned for regular academic instruction), lends an air of academic credibility to the support service. Similarly, the overt endorsement of the SI program from the participating course professor lends further authority to the claim that SI is valuable.

Of course, the voluntary nature of the SI pact—which is renewable every week (or every day, for that matter)—comforts the wary student who shuns taking on additional responsibility. The combination of voluntary participation, early intervention, and proactive support differentiates the SI model from the traditional medical model which relies on diagnosis of signs and symptoms followed by prescriptive treatment.

Theories Behind the Strategies

The remainder of this chapter briefly describes some of the theorists and researchers whose work the SI developers found particularly helpful. A conscious decision was made to base the SI model on a developmental perspective because that perspective puts the burden of responsibility on the service providers. Such a theory base assumes that the students will learn if the conditions for learning are in place. The leading researcher in the developmental field at the time the SI model was created was Jean Piaget. Robert Blanc is to be credited with anchoring SI in a developmental framework and designing original research studies.

Jean Piaget and Constructivism

Jean Piaget formulated a comprehensive model of cognitive development. Although Piaget studiously avoided prescriptive statements concerning education, preferring to confine his studies to epistemology, several of those with whom he worked have applied his insight to education. The conclusion of this line of research as it applies to SI is this: many students in tertiary educational institutions have not yet developed the abstract reasoning that will allow them to learn new ideas simply by listening to lectures and reading text. In recent years, some of Piaget's ideas have been formalized into an educational theory called "constructivism." Proponents of constructivism take their name from Piaget's observation that students must "construct" their own knowledge in order to be able to understand and use it.

Students typically perceive their need as entirely content-centered. Experience shows, however, that the most common need among marginal students is for the learning and thinking skills which are basic to content mastery. Arons and Karplus (1976) observed that 50% of entering college freshmen did not have reasoning skills at the "formal," ("abstract") operational level described by Piaget and Inhelder (1958).

Students who appear to operate at the concrete (i.e., nonabstract) level consistently have difficulty processing unfamiliar information when it is presented through the abstract mediums of lecture and text. Their questions about material are often detail-oriented and superficial. Rarely do they ask or answer questions which require inference, synthesis, or application. They can operate at more advanced levels once they have mastered a concept; but, to do so, they require regular instruction that either anchors the concept directly in their previous experience or provides a concrete experience with data from which the concept may be inferred. (Atkins & Karplus, 1962; Fuller, 1980; Karplus et al., 1976; Renner et al., 1976).

A wide variety of tasks can present overwhelming obstacles to individuals who have not attained the advanced stage of intellectual maturity which Piaget and Inhelder (1958) identified as formal or abstract. This problem is complicated in foundation courses where the most common means of assessment is detail-oriented exams, which, by their design, reinforce rote memory. It is, therefore, possible for students both to achieve high marks in courses and to fail to understand the principal concepts that must be assimilated if they are to retain and use the memorized material. The effect of these differences in learning patterns surfaces in more advanced courses which require students to demonstrate integration and application of the knowledge they have previously acquired.

One task of the SI leader is to guide students as they raise their operational levels. Specifically, SI leaders focus on intellectual tasks such as the identification and control of variables, a

reasoning skill common to both the natural and social sciences as well as mathematics. Similarly, SI leaders focus on helping students to recognize proportional relationships and to use ratio reasoning when it is appropriate to do so. Although students are able to use hypothetical/deductive reasoning on an informal or intuitive level, they often need help to see the relevance of this kind of thinking in a formal academic discipline. Application of the concept of probability, on the other hand, often escapes students unless direct attention is drawn to it. A task of the SI leader is to make explicit the instances in which the aforementioned reasoning patterns and processes are implicit in either lecture or text.

The SI leader functions in another key role to help students attain academic maturity: the leader helps students to analyze their own learning. This metacognitive approach to learning finds application in its most basic form when the SI leader helps students to figure out what they do and do not understand about a concept and then to frame questions which eventually will lead to their more complete understanding. Skilled and experienced learners know how to judge their own understanding and to ask such questions. *Less successful learners often fail to distinguish between what* they do and do not understand. SI leaders, then, must be sensitive to levels of student development and performance across a wide spectrum.

Edgar Dale's Cone of Experience

Compatible with Piaget's theory base is Edgar Dale's Cone of Experience (Dale, 1969) which conveys some of Piaget's ideas on learning in a graphic form. Proven useful for working with students in the lower grades, this model is also relevant for working with college-aged students. Dale proposes that learning is stimulated progressively from concrete (i.e., hands-on) experiences to abstract (i.e., verbal and visual) symbols. The foundations for instruction reside in direct sensory experiences combined with purposeful interaction with the stimuli sources. Dale's Cone is most useful as a guide for introducing and building concepts. At the most basic and most effective level of instruction, students are introduced to new material through an actual hands-on experience or "doing the real thing." Students see, do, and talk about the concept. Learning is the most complete if these conditions can be met.

At the top of the cone, or triangle, is lecture and text. Dale's model suggests that these passive instructional modes are the least effective ways to introduce new concepts to students. Between the top and the bottom of the cone, Dale has several other levels of instruction including giving a talk, watching a demonstration, seeing a film or picture. For SI leaders, experience with Dale's Cone helps them design the instructional activities to meet student needs.

Vincent Tinto's Model of Student Retention

Tinto's model of student retention is one of the most frequently cited in professional literature. Tinto's research suggests that students who are integrated into both the academic and social dimensions of the institution are more likely to persist (Tinto in Spann, 1990; Tinto, 1987).

> *Drawn from the work of Durkheim and* Van Gennep, this theory will argue that colleges and universities are like other human communities; that student departure . . . necessarily reflects both the attributes and actions of the individual and those of the other members of the community in which that person resides. Decisions to withdraw are more a function of what occurs after entry than of what precedes it. They are reflections of the dynamic nature of the social and intellectual life of the communities housed in the institution, in particular of the daily interaction occurring among its members. Student departure may serve as a barometer of the social and intellectual health of institutional life as much as of students' experiences in the institution (Tinto, 1987, p. 6).

Figure 1. **Edgar Dale's Cone of Experience**

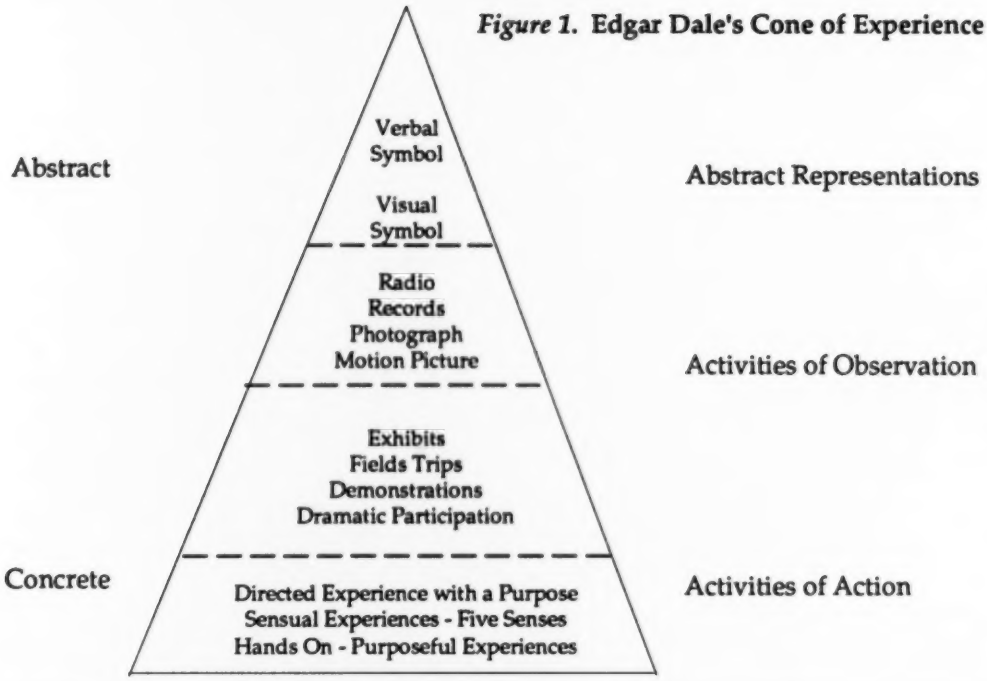
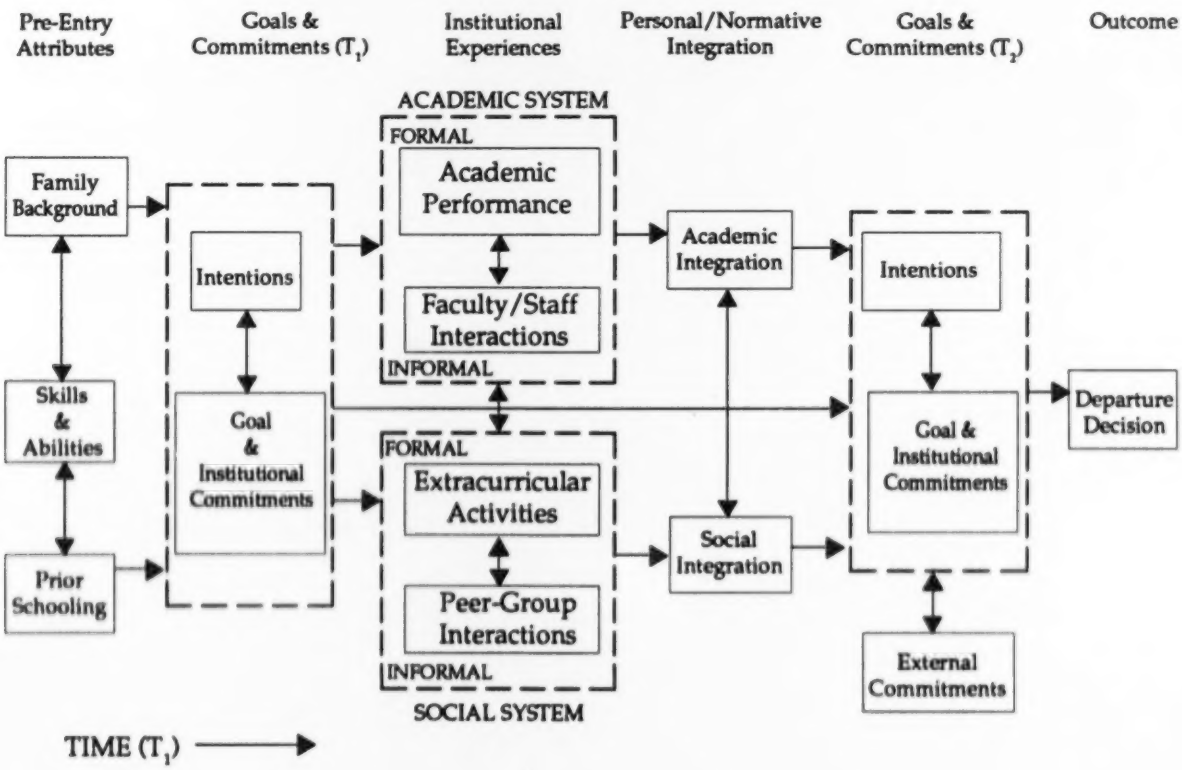


Figure 2. **Vincent Tinto's Model of Student Retention**



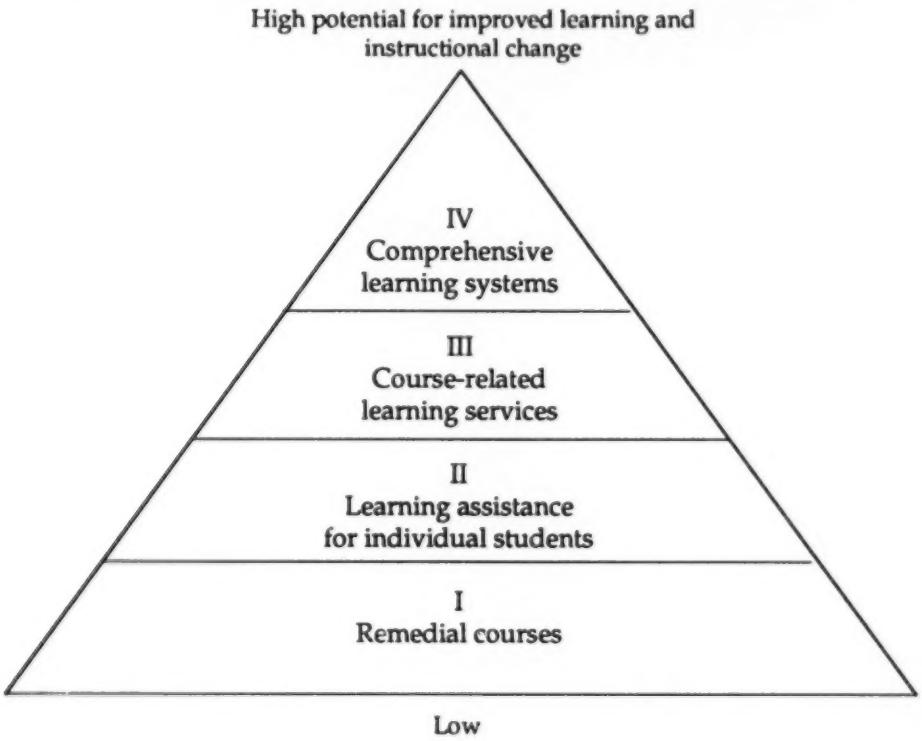
A key concept in Tinto's model is that the departure decision for a student is more heavily influenced by experiences with the college environment than by the previous academic and social experiences that occurred before college attendance. The institution has an opportunity to manipulate its environment to provide, through informal and formal contacts, an opportunity for the student to be integrated into the social and academic dimensions of the institution.

Rather than remain powerless in the face of the previous academic record of the student, the institution can decide to make available resources and to change its campus environment. SI is a viable and effective option for changing the campus environment. Through SI, students become less isolated and are assisted in assimilating into the culture of the institution, both academically and socially.

Keimig's Hierarchy of Learning Improvement Programs

Keimig (1983) developed a "Hierarchy of Learning Improvement Programs" by which programs were differentiated on the basis of two criteria: the comprehensiveness of the program and the degree to which the program was institutionalized into the overall academic delivery system. Highly ranked programs were not isolated, but were integrated into the heart of the institution. From lowest to highest, the four levels of programs in Keimig's hierarchy were: isolated courses in remedial skills, tutorial assistance to individual students, course-related supplementary learning activities, and college courses that have been significantly changed and have comprehensive learning systems built into them.

Figure 3. **Keimig's Hierarchy of Learning Improvement Programs**



Remedial courses were rated lowest by Keimig since they often taught academic skills in isolation from actual course content. It was very difficult for students to transfer successfully the skills necessary to succeed from the remedial course to other college-level courses . Students soon reverted back to their old habits. In some cases, the exit competencies required in the remedial courses were not as high as the entry level prerequisites for the introductory level college courses.

In terms of long-term effectiveness, tutoring was also rated near the bottom of the academic support hierarchy. Keimig found four major disadvantages with individual tutoring:

1. Because of its "drop-in" nature, it lacked systematic activity;
2. Tutoring failed to provide enough assistance soon enough to make a difference;
3. The assistance was too late since it generally came after academic difficulty or failure had been experienced; and
4. The students who needed tutoring the most generally used it the least.

In a review of the professional literature concerning tutoring, Maxwell (1990) observed the following: some studies find that high-ability or more experienced students benefit most from tutoring; it is rare for studies to show that tutored students improved their grades; there is no evidence that tutoring helps the weakest students.

Programs similar to SI were ranked near the top of the effectiveness scale since, ". . . students' learning needs are presented as being necessary because of the nature of the objectives and content of the course rather than because of students' deficiencies. Therefore, all students have access to supplementary. . . instructional experiences which benefit nonremedial students as well" (Keimig, 1983, p. 23). The key to program success is the link between academic services and specific courses.

Keimig's description of the highest level of program in her hierarchy, the comprehensive learning system, was reserved for classes where the professor has made significant changes in his/her instructional delivery. "The student's overall developmental needs are provided for, including interpersonal and affective needs and cognitive and requisite skills. The instructor monitors students' responses (including learning) and adjusts teaching strategies and learning experiences individually" (Keimig, 1983, p. 24).

It should be noted, however, that some institutions (e.g., Salem State University) have introduced SI through faculty development grants. Because the SI leaders and the course professors worked closely together as a team to meet student needs, the SI program at Salem State would meet Keimig's "highest" level. The SI program, as it is usually implemented, complements the professor's instructional style and requires no change by the professor in the way the instructional material is initially delivered. Most professors would not choose to modify their courses to fit the criteria for Keimig's Level Four designation. Therefore, SI is able to fit the criteria for the highest rated type program that does not require professors to change their instructional delivery style. Using SI to facilitate faculty development, however, appears to be a growing trend within institutions not only here in the United States, but in other countries also.

Collaborative Learning

The effectiveness of peer collaborative learning has been well researched and documented. Early theorists—Dewey, Piaget, and Bruner—provided clear direction that leads to the value of peer collaborative learning. Developmental psychologists carried on the early research, and recent research in college student development and retention lends further empirical support.

Since its inception in 1973, the SI model has relied on peer group learning, now described as collaborative learning (Tomlinson, 1989; Whitman, 1988). A recently completed comprehensive annotated bibliography on collaborative

learning (Tumey, 1992) includes the SI model in over 50 collaborative learning citations, giving SI a significant representation.

As Maxwell (1979) has noted, however, most of the research and work on collaborative learning had previously been conducted at the elementary and secondary school level; its systematic introduction to postsecondary education and research on its effects in higher education settings only date back to the 1970s. The success of Treisman (1990) in improving academic performance of non-Caucasian mathematics majors has generated widespread interest in his academic program which includes, as an important component, collaborative learning.

When comparing students studying alone to those studying in groups, educators have found that group study results in higher levels of thought and increased retention of information (Johnson & Johnson, 1986; Light 1990, 1992). Research conducted by Light (1992) at Harvard University found group work particularly important for persistence in science courses. Shlipak (1988) also found that group work was very important for the persistence of women in the physical sciences.

In addition to improved academic performance, it is generally believed that students enhance their self-esteem through collaborative learning. "Considerable evidence shows a collaborative environment will elevate students' feelings of self-worth more than a competitive one" (Sandberg, 1990, p. 2). Students will not have an opportunity to increase their self-confidence if they do not have an opportunity to practice their skills. Traditional classrooms with a lecture-based format typically fail to provide an opportunity for peer-group interactions. SI sessions provide a safe and non-threatening environment for students to clarify their understanding and practice newly learned skills. Mastery of content material leads toward increased self-confidence.

Some researchers have suggested that collaborative groups provide a better learning environment for returning women students than traditional lecture-based classes (Belenky et al., 1986). Other researchers cite the cognitive and affective domain increases with the support of peers for high-risk students (Brookfield, 1987; Johnson et al., 1984; Resnick, 1987; Slavin, 1983, 1989/90). A program of Supplemental Instruction can be one component in a comprehensive plan to help change the campus climate for today's diverse student body.

Learning to Work Together

In addition to the primary benefit of helping students perform better academically, collaborative learning groups provide an environment for students to work together. It is interesting to note that most jobs in the "real world" require teamwork and camaraderie to maximize both individual and group rewards. While education purports to prepare students for this world, traditional modes of instruction still encourage individualism and often discourage cooperation.

While there must be a balance between individual and group work, students may be ill-prepared to fit into a multicultural work world if they have not learned the skills of collaboration and cooperation. Vincent Tinto said this most succinctly.

> One way of integrating all students is to make sure our learning communities are open communities. We must make sure that classrooms do not disenfranchise or isolate students by their structure or by their content. We have to be concerned about the classroom experience as a liberating, integrative experience for all, not just some, students. We also have to think about the ways in which the classroom experience can lead students to develop supportive, rather than competitive, peer relationships; that is, we must seek ways to integrate, not isolate, the academic and social experiences of students. To have one without the other is a mistake (Tinto in Spann, 1990, p. 22).

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Appendix

U.S. Institutions Currently Using Supplemental Instruction

Alabama
University of Alabama-Tuscaloosa

Arkansas
Harding University
John Brown University
Southern Arkansas University
University of Arkansas-Fayetteville

California
Azusa Pacific University
California Polytechnic State University
California State University - Long Beach
California State University - Los Angeles
California State University - Northridge
California State University - Stanislaus
Cerritos College
Christ College Irvine
Deanza College
Glendale Community College
Grossmont Community College
Occidental College
Point Loma Nazarene College

Colorado
Colorado State University
University of Colorado
University of Northern Colorado

Florida
Bethune-Cookman College
Florida Community College-Jacksonville
Polk Community College

Georgia
Abraham Baldwin College

Idaho
Boise State University
Ricks College

Illinois
Blackburn College
Chicago State University
Greenville College
Highland Community College
Illinois Institute of Technology
Illinois State University
Lincoln Land Community College
National Louis University
Northern Illinois University
Prairie State College
Saint Xavier College
Southern Illinois University-Edwardsville
Triton College
University of Illinois-Champaign
University of Illinois-Chicago

Indiana
Ball State University
Indiana University-Bloomington
Indiana University-Kokomo
Indiana University-Purdue University

Iowa
Des Moines Area Community College
Graceland College
Saint Ambrose University
University of Northern Iowa

Kansas
Barton County Community College
Bethel College
Brown Mackie College
Colby Community College
Fort Hays State University
Fort Scott Community College
Hutchinson Community College
Washburn University
Wichita State University

Kentucky
University of Kentucky

Louisiana
University of New Orleans

Maryland
Anne Arundel Community College
Charles County Community College
Towson State University

Massachusetts
Bristol Community College
Emerson College
Massasoit Community College
Salem State College
Suffolk University
Worcester Polytechnic Institute

Michigan
Davenport College
Jackson Community College
Kalamazoo Valley Community College
Kirtland Community College
Lawrence Technical University
Macomb Community College
Marygrove College
Michigan State University
Mid-Michigan Community College
Monroe County Community College
Muskegon Community College
Northwestern Michigan College
Oakland University
Wayne County Community College
Wayne State University
Western Michigan University

Minnesota
Augsburg College
College of St. Catherine
College of St. Scholastica
Duluth Community College
University of Minnesota-Duluth
University of Minnesota

Mississippi
Jackson State University

Missouri
Missouri Southern State College
Northwest Missouri State University
St. Louis Community College-Meramec
St. Louis University
University of Missouri-Kansas City
University of Missouri-Rolla
University of Missouri-St. Louis
William Jewell College

Montana
Eastern Montana College
Northern Montana College

Nebraska
University of Nebraska-Lincoln

New Hampshire
Franklin Pierce College

New Jersey
Caldwell College
Centenary College
Glassboro State College
Kean College
Rutgers University-Bush
Rutgers University-Camden
Trenton State College
Upsala College
William Paterson College

New York
Borough Of Manhattan Community College
Broome Community College
City College of New York
Community College of Finger Lakes
Corning Community College
D'Youville College
Genesee Community College
Hudson Valley Community College
Manhattanville College
Nassau Community College
Onondaga Community College
Roberts Wesleyan College
State University of New York-Fredonia
State University of New York-Morrisville

North Carolina
Appalachian State University
North Carolina State University
Pfeiffer College
University of North Carolina-Chapel Hill
University of North Carolina-Charlotte

North Dakota
University of North Dakota

Ohio
Baldwin-Wallace College
Kent State University
Lorain County Community College
Ohio University
University of Toledo Community & Technical
University of Akron-Wayne College
University of Dayton
Wilmington College
Wright State University

Oregon
Eastern Oregon State College
Linn-Barton Community College
Portland Community College

Pennsylvania
Kutztown University
Lehigh County Community College
Montgomery County Community College
Penn State University-Delaware County
Penn State University-Mont Alto
Penn State University-University Park
Pinebrook Junior College
Shippensburg University

South Carolina
Greenville Technical College
University of South Carolina-Lancaster

Texas
Kingwood College
Northlake Community College
Stephen F. Austin State University
Texas Lutheran College
University of Houston
University of Texas-Austin

Utah
Salt Lake Community College
Snow College
University of Utah
Utah State University
Weber State University

Vermont
Champlain College
University of Vermont

Washington
Edmonds Community College
Everett Community College
Northwest Indian College
University of Washington
Western Washington University

Wisconsin
Milwaukee Area Technical College
University of Wisconsin-Parkside